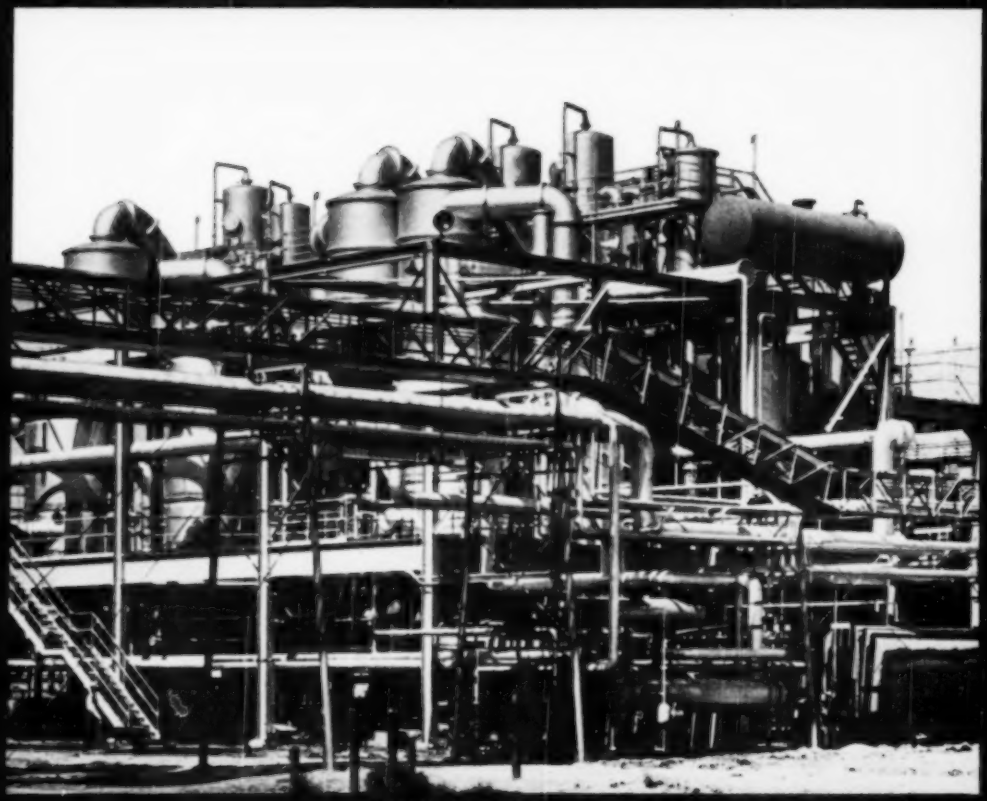
Chemical Engineering

WITH CHEMICAL & METALLURGICAL ENGINEERING

APRIL 1949



HOUSTON'S MILD CLIMATE PERMITS OUTDOOR CONSTRUCTION OF DIAMOND'S HUGE ARRAY OF CAUSTIC-SODA EVAPORATORS

A McGraw-Hill Publication

Fifty Cents

MINERAL-RICH PHOSPHATE IS VITAL TO EVERYBODY EVERY DAY



(A dramatic example of one of the many ways Phosphate serves you)

A WONDERFUL CHEMIST, THE COW!

But, like the dairy industry, she too depends on Phosphate

Bossy, Queen of the Dairy Industry, is a manufacturing chemist of unusual achievement. She produces a really amazing amount of fine-flavored, nutritious milk, wonderfully enriched with Vitamin B. Yet she is not able to manufacture the essential minerals her system requires such as phosphorus and calcium to produce milk of consistently high quality.

So the dairy farmer protects Bossy against mineral deficiencies in her diet by the regular use of phosphate in the plant foods which promote the growth of nourishing pasture crops and silage. And in the mineral supplements which are added to her feeds.

Phosphate continues to guard the purity and nourishing goodness of milk as it flows from dairy farm to you. Phosphate, in the form of phosphate compounds, is extensively used in the detergents which are so essential in cleaning and purifying milk handling equipment in the dairy industry. And manufacturers of evaporated milk use disodium phosphate to improve the heat stability of milk during the sterilization process in order to give their products a uniform body.

International mines phosphate in Florida and Tennessee for plant foods, for livestock feed supplements and for the chemical manufacturers who produce phosphate compounds for the dairy industry and for many food, pharmaceutical and chemical purposes.



Florida Pebble Phosphate

ALL COMMERCIAL GRADES

Tennessee Phosphate

PHOSPHATE DIVISION

International Minerals & Chemical Corporation

General Offices: 20 North Wacker Drive, Chicago 6

APRIL
1949

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How Utah Electric the Challenge OF



Soda ash has about 90,000 industrial uses. This battery of three Utah electric screens aids materially in supplying the demand for soda ash used in this country.

FOR IMPROVED FINE SIZING SPECIFY UTAH SCREENS



Utah screens operate at 3600 vibrations per minute on 60 cycle current, 3000 on 50-cycle, 1500 on 25-cycle current. Straight-line motion.

Hinged door with weighted arms makes cloth inspection easy. Quick-opening covers provide access for tensioning screen cloth.

It's a money-saver, too—operates on power requirement of only 600 to 1200 watts, depending on application and frequency of vibration.

Almost no maintenance is required! Electro-magnetic principle requires no rotating, sliding or striking parts. Nothing to lubricate.

Screens Met

SODA ASH SIZING

BLINDING of fine screen mesh made this job of soda ash sizing a difficult one. Then this processor installed the battery of three *Utah* electric screens shown at left. Result: Blinding became a negligible consideration . . . maintenance was reduced, too!

Soda ash is only one of many materials screened successfully with *Utah* electric screens. These modern Allis-Chalmers screens are flexible enough in operation to handle a wide range of fine, granular materials from 10 to 48 mesh (dry) or 65 mesh (wet).

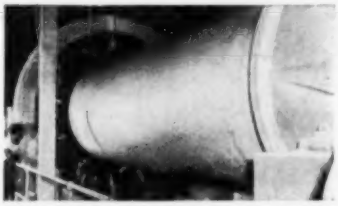
Utah screens provide finger-tip control of amplitude of vibration. Operation can be precisely controlled to suit conditions of fine sizing. Constant air gap setting is maintained by rigid rubber mounted steel vibrator bars. No flexible reeds, springs or striking parts.

Troublesome blinding, caused by clogging, near-size particles, is almost entirely done away with in the *Utah* screen. A Vari-Pulse non-blinding device periodically increases vibrating amplitude from normal operating setting to maximum, momentarily, to clear screen mesh. No frequent shut-downs to brush screen surfaces!

Get more facts about *Utah* screens from the A-C representative in your area. Or write for **Bulletin 07B7044.**

ALLIS-CHALMERS, 1147A SO. 70 ST.
MILWAUKEE, WIS.

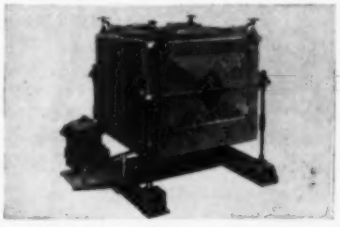
ALLIS-CHALMERS BUILDS EQUIPMENT FOR OVER 20 UNIT OPERATIONS



GRINDING Silex lined pebble mills with flint pebble grinding media eliminate iron contamination, are widely used for silica reduction. Allis-Chalmers builds a complete line of pebble mills with diameters 5 to 8 ft; lengths 10 to 24 ft. Installation shown above is in a chemical processing plant.



POWER DISTRIBUTION Flexibility to meet shifting loads without voltage drop is provided by Allis-Chalmers unit substations. Any combination of transformer and switchgear elements can be obtained in this completely modern line. Factory-built with no live parts exposed. Send for **Bulletin 11B6285.**



SIFTING Heavy Duty Low-Head Gyratory Sifter has series of interchangeable sieves, 3 to 7 sieves high for 2 to 8 separations . . . can handle two materials at same time. Has large capacity per sq ft of cloth area. Compact and dust-tight. **Bulletin 06B6124A.**

Low-Head, Vari-Pulse are Allis-Chalmers trademarks

A 2662

A-C ALLIS-CHALMERS

ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment—Biggest of All in Range of Industrial Products



Now...

2 New AO RESPIRATORS for Nuisance Dusts

R-2900 R-2900A

Comfortable Positive-Acting Popularly-Priced



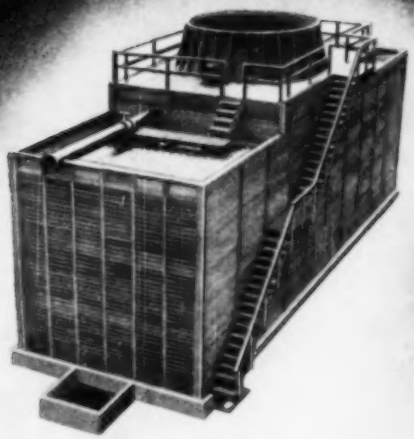
Here are two NEW respirators — the AO R-2900 and AO R-2900A that fill a definite need in applications such as coal yards, grain elevators, cement mills, woodworking plants and some grinding operations — wherever a *sound*, *serviceable* and *economical* respirator is required for combating light concentrations of nuisance dusts. (For protection against pneumoconiosis, silicosis and asbestosis dust hazards, the new, revolutionary R-2000 Respirator is recommended.)

Both the R-2900 and R-2900A are similar in streamlined design to the R-2000. Vision is unobstructed both front and side . . . filter is lightweight and REPLACEABLE . . . retainer cup light and durable. Any face may be fitted comfortably without adjustment and due to the lack of overall respirator weight, workers report no discomfort even when wearing the respirators for long periods. Inhalation and exhalation valves of the R-2900 (the R-2900A has no inhalation valve but is otherwise identical) prevent infiltration of dust while providing easy breathing action. The face masks of both respirators are of highest quality rubber with edges smoothly rounded for POSITIVE SEAL, no tools are necessary for disassembly and the respirators are quickly, easily cleaned. Ask your nearest AO Safety Representative about the complete line of AO dust protection equipment.

American Optical COMPANY *Safety Division*

Southbridge, Massachusetts • Offices in Principal Cities

Specify MARLEY Double-Flow



FOR SAFE OPERATION AND MAINTENANCE

STAIRWAY . . . DOUBLE-FLOW towers are equipped with a stairway built at the enclosed endwall of the tower. This eliminates fog envelopment and ice formation on stairways or ladders built over louvered sections. Operators do not have to climb high, dangerous ladders.

HANDRAILS . . . stairway and wide, level fan deck are guarded with high handrails. At no time is the operator at the mercy of high, gusty winds or in danger of inadvertently falling off the tower.

OUTSIDE WALKWAY . . . a short stairway leads to a walkway over each distribution basin. Water level may easily be adjusted or the basin cleaned. Complete flexibility of operation or maintenance is a result without the usual risks and dangers involved.

INSIDE WALKWAYS . . . through the interior of the tower, walkways enable the operator to observe water breakup, condition of structure, and operating conditions of the tower. This can all be checked while the tower is in operation without danger to the operator.

WALLED FAN CYLINDERS . . . each fan is enclosed with a fan cylinder . . . high enough for safety, low enough for easy inspection. And, there is plenty of room between the cylinder and fan deck railing for free movement without risk.

Tower owners and operators know that MARLEY DOUBLE-FLOW towers are SAFE TOWERS . . . safe in any stage of operation or maintenance . . . safe in any weather.

That's why more and more Safety Engineers of America's great industries are recommending MARLEY DOUBLE-FLOW COOLING TOWERS.

Ask for a MARLEY Factory-Trained APPLICATION ENGINEER to tell you more about the MARLEY DOUBLE FLOW Cooling Tower and its numerous SAFETY FEATURES. He'll be glad to help you solve YOUR water cooling problems. No cost or obligation.

MARLEY COOLING TOWERS

THE MARLEY COMPANY, INC. • KANSAS CITY 15, KANSAS

TERM OF ACTIVITY FOR THESE TROUBLEMAKERS HAS



Expired

. . . YOU CAN SAY EXACTLY THAT WHEN YOU INSTALL THE . . . .

CASH STANDARD Streamlined PRESSURE REDUCING VALVE TYPE 1000



THESE ARE THE BENEFITS YOU GET

1. **Maximum capacity when needed most.**
2. **Accurate pressure control under toughest working conditions.**
3. **Trouble-free service.**
4. **Smooth operation.**
5. **Tight closure.**
6. **Speedier production results.**
7. **Elimination of failures.**
8. **Cost-saving operation.**
9. **No spoilage.**
10. **Practically zero in maintenance.**

USERS TELL THE BENEFITS . . .

"Our CASH STANDARD '1000' valve is used on a steam motor car to reduce the boiler pressure from 800 psi to 100 psi for the operation of a turbo generator for driving the fuel oil burner and blower. It operates by means of a pressure operated relay valve when the vehicle is not running, every time that the fire under the boiler goes on and also floats a storage battery on the line. I like the CASH STANDARD '1000' reducing valve because it is SIMPLE IN CONSTRUCTION, LIGHT IN WEIGHT, AND REQUIRES PRACTICALLY NO MAINTENANCE."

—from an engineer

"The CASH STANDARD '1000' Valves that we have in this plant are proving most SATISFACTORY IN ALL RESPECTS."

—from a manufacturer

"Most of our Type '1000' Valves have been in service for about 4 years and HAVE NOT REQUIRED ANY ATTENTION in that time except to adjust for different pressure requirements."

—from a manufacturer

"The CASH STANDARD '1000' Valves that we have in use have given us ABSOLUTELY NO TROUBLE and are preferred by our engineers to anything else on the market."

—from a vice president

"The ELIMINATION OF STEAM LEAKS and LOW MAINTENANCE COST have been especially gratifying. The LOW INITIAL COST, LOW MAINTENANCE, and TROUBLE FREE OPERATION results in the MOST ECONOMICAL PRESSURE REDUCING VALVE we have been able to purchase."

—from an instrument engineer

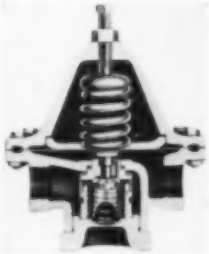
WRITE FOR BULLETIN 962

CASH STANDARD CONTROLS.. VALVES

A. W. CASH COMPANY
DECATUR, ILLINOIS

BULLETINS AVAILABLE ON OTHER CASH STANDARD VALVES

Send for them



Bulletin 950—features the CASH STANDARD Type D Single Seat Pressure Reducing and Regulating Valves for use with most fluids. Shows simple inner working parts that save in maintenance. Diagram explains how valve works. Blueprint shows simplicity of installation.

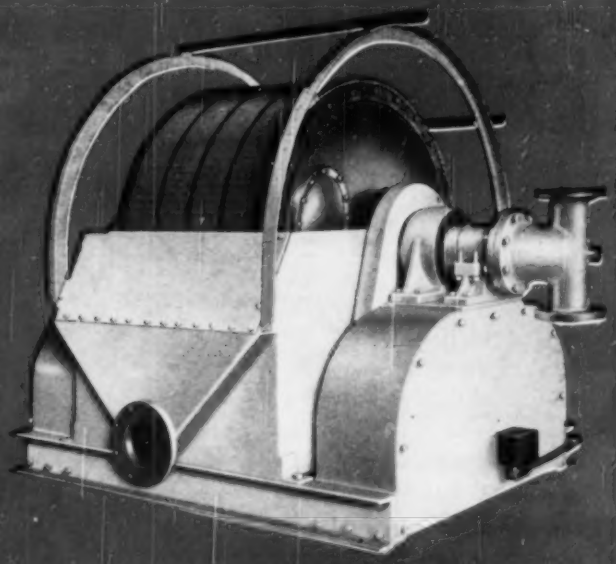


Bulletin 956—features the CASH STANDARD Type 4030 Back Pressure Valve — designed to automatically maintain a constant pressure in the evaporator corresponding to a constant temperature desired. Shows an Ammonia and Freon Gas Capacity Chart based on ABSOLUTE pressures.

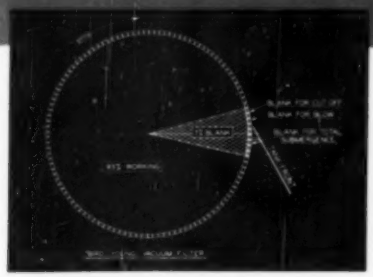


Bulletin 966—features the CASH STANDARD Self-Contained, Pilot Operated Type 10 Pressure Reducing and Regulating Valve for use with water or air, with any gas or oil that is non-corrosive, and with refrigerating fluids such as Ammonia and Freon. Many interesting particulars explained such as: how valve works, tight seating, large capacity, no waste, no water hammer or chatter.

HERE'S A VACUUM FILTER THAT WORKS *DIFFERENTLY* AND *BETTER...*



THE BIRD-YOUNG UNIVERSAL FILTER



HERE'S HOW IT WORKS

The multi-paneled, rotating cylinder is 93% effective. The cake is completely removed by pneumatic "blow-back". No scraping or doctoring. The filter cloth or wire is always kept clean. Full capacity is continuously maintained.

Counter-current washing may be used with wash liquor kept separate in multiple stages. Exceedingly sharp separation is effected.

SEE WHAT IT CAN DO FOR YOU

The Bird-Young Filter is rightly called a *universal* filter because of its demonstrated ability to handle both ordinary and extraordinary filtering and washing operations.

For the first time, *complete* discharge of the filter cake is assured. A *thin* cake is discharged even more efficiently than a thick cake. This means faster speed, higher capacity, a more thorough wash and better dewatering.

For full information about the application and performance of this different and better vacuum filter as applied to your product, get in touch with **BIRD MACHINE COMPANY, South Walpole, Mass.**

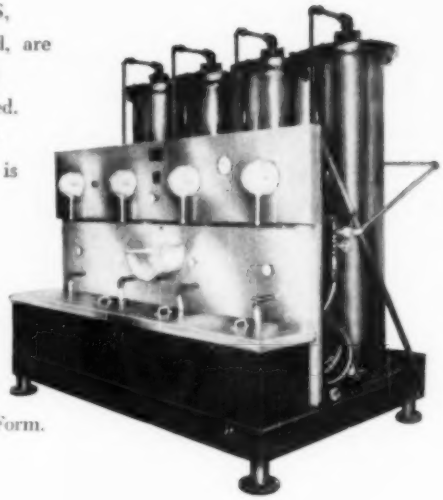
THE BIRD-YOUNG UNIVERSAL FILTER

designed, constructed and applied by the builders of the
BIRD CONTINUOUS CENTRIFUGAL FILTER

Barnstead DEMINERALIZERS

Cut Pure Water Costs for Industry

BARNSTEAD WATER DEMINERALIZERS, which purify water by the ion-exchange method, are proven money-saving investments for industrial plants where high-test, mineral-free water is needed. In many instances, savings are great enough to pay for the equipment in less than a year. Installation is no problem, since the Barnstead Demineralizer comes as a "package unit" with built-in regenerating tanks and all interconnecting piping, as shown in the 500 gallon per hour model at the right. A Barnstead Engineer will gladly make recommendations for solving your pure water needs, without obligation or cost to you. Write today for free Water Survey Form.





Demineralized Water for Laboratories with a Barnstead Bantam

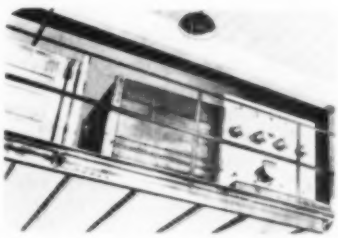
A practical, efficient means of providing high-test mineral-free water for laboratories or other places where the amount of water needed does not justify regenerative operations. Employs renewable cartridge which is replaced when exhausted. Electric indicator tells when to replace. New high-capacity cartridge removes 1200 grains of salt. Flow rate from 5 to 8 gals. per hour. Send for Bulletin 120.

Gentlemen:
Please send me a Water Survey Form for determining my pure water requirements.

NAME .....
FIRM .....
ADDRESS .....
CITY ..... STATE .....

BARNSTEAD DEMINERALIZER AT GENERAL ELECTRIC PLANT

Photo shows installation of Barnstead Demineralizer of 200 gallon per hour capacity at Lynn General Electric plant. It is located on a balcony beside two 500 gallon Barnstead Storage Tanks which provide gravity feed over a large plant area. The demineralized water is used for electroplating.



First in Pure Water Since 1878

Barnstead STILL & STERILIZER CO.

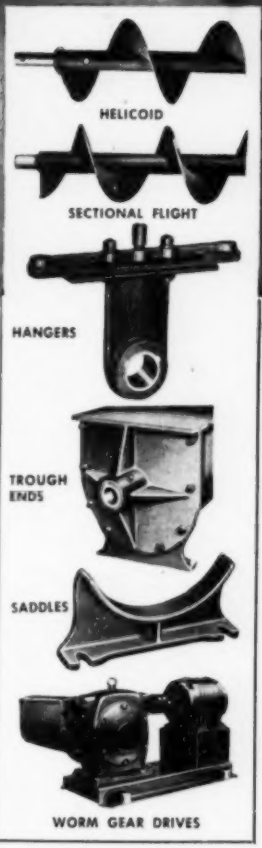
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Does the Whole Job





You Get Every Part, from Flighting to Drive, from One Responsible Manufacturer

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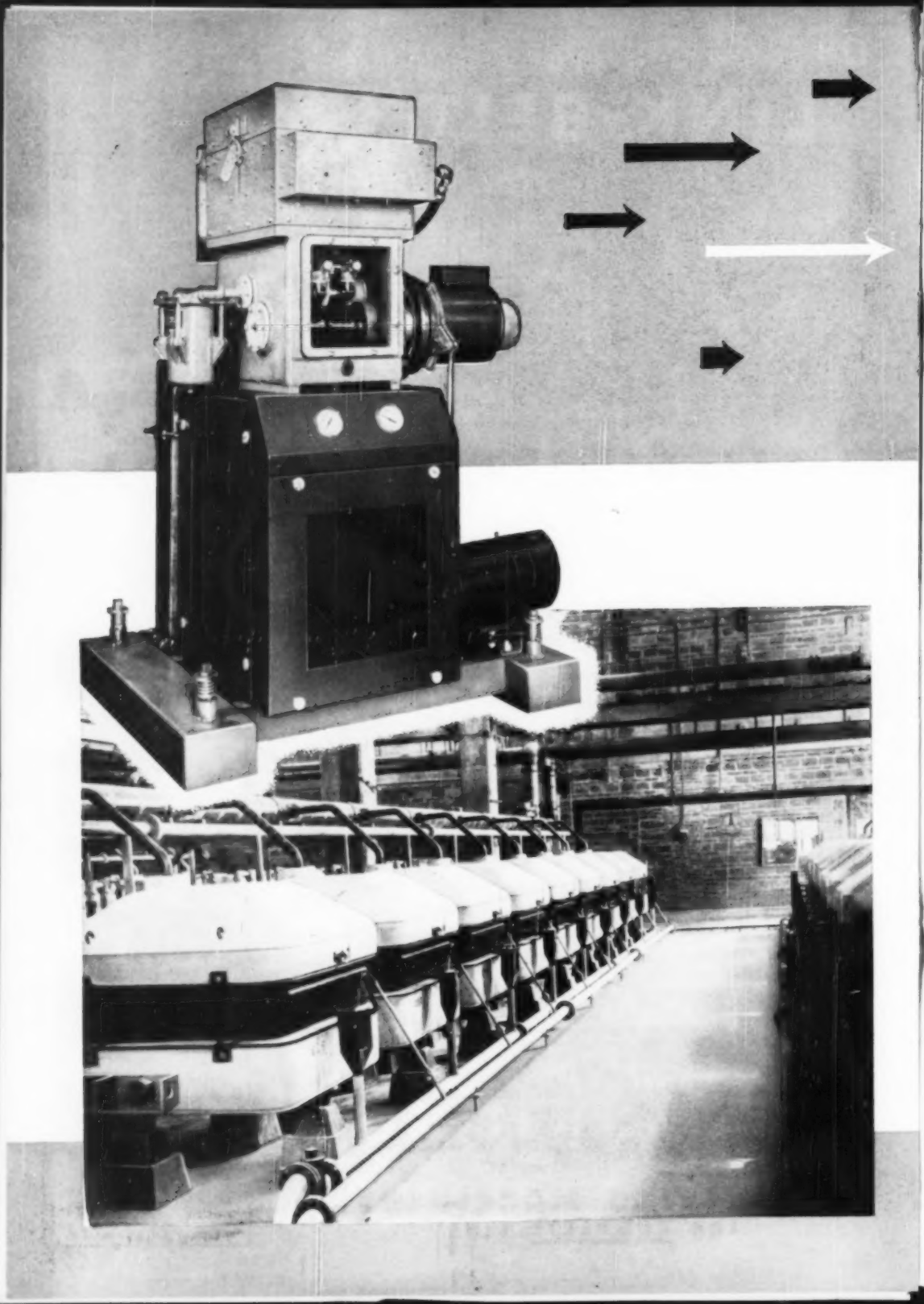
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"THE COMPLETE LINE"

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Now you can design your Cell Rooms the way you want them!

Here's why... I-T-E now makes available a

NEW LOW VOLTAGE MECHANICAL RECTIFIER

for applications up to 10,000 Amperes, at 50 to 400 Volts D-C

with these significant advantages:

1. *Higher operating efficiency*—actually 92% to 96.5% in the 50 to 400 volt range! You don't have to resort to high voltage to obtain high efficiency, if you use the I-T-E Mechanical Rectifier.

2. *Reduced Size.* A typical plant layout will show space savings of up to 50%. Consider what this means to you in decreased building costs.

3. *Simplified Maintenance.* No complicated tools or instruments are needed for the adjustment and maintenance of the new I-T-E Mechanical Rectifier.

4. *Low over-all cost:* Unit assembly at factory reduces installation cost. NO CRANE SERVICE is required in Rectifier Building.

FIRST SUCH UNIT IN AMERICA NOW INSTALLED AND OPERATING!

● The Mechanical Rectifier made its debut and became a reality in this country on February 8th, 1949, when a unit rated 3500 amperes was placed in service in the plant of the Buffalo Electro-Chemical Company, Buffalo, N. Y., carrying 5000 amperes at 260 volts d-c with an efficiency of 96%.

Get the complete story!



I-T-E Bulletin 4809 contains complete technical information on the I-T-E Mechanical Rectifier, as well as a detailed presentation of its operating principles. Send for it today!

I-T-E MECHANICAL RECTIFIERS

I-T-E CIRCUIT BREAKER COMPANY, 19TH AND HAMILTON STREETS, PHILADELPHIA 30, PENNSYLVANIA
31 OFFICES IN THE UNITED STATES • In Canada, EASTERN POWER DEVICES LTD., TORONTO

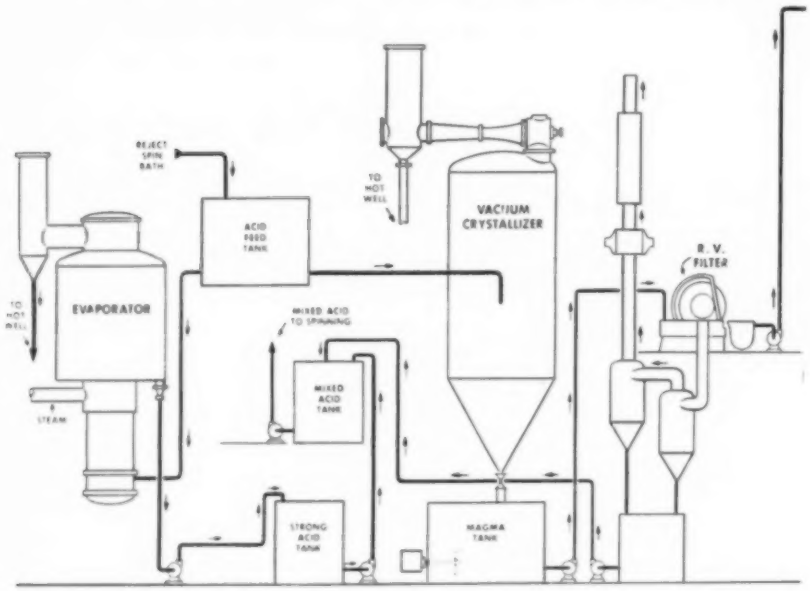
SWITCHGEAR • UNIT SUBSTATIONS • ISOLATED PHASE BUS STRUCTURES
CIRCUIT BREAKERS • MECHANICAL RECTIFIERS • RESISTORS • SPECIAL PRODUCTS

Swenson Process Engineering

recovers valuable chemicals

In viscose rayon and cellophane plants, the material is produced in a sulfuric acid bath. As the bath is spent, it becomes more and more dilute, and contains increasing proportions of by-product Glauber salt. The Swenson spin bath recovery process removes this chemical as well as water, returning the bath to the spinning system.

Special evaporators, crystallizers, and filters were designed for the purpose. The vapor-head-type evaporator is notable



SWENSON EVAPORATOR COMPANY

Division of Whiting Corporation

15669 Lathrop Avenue — Harvey, Illinois

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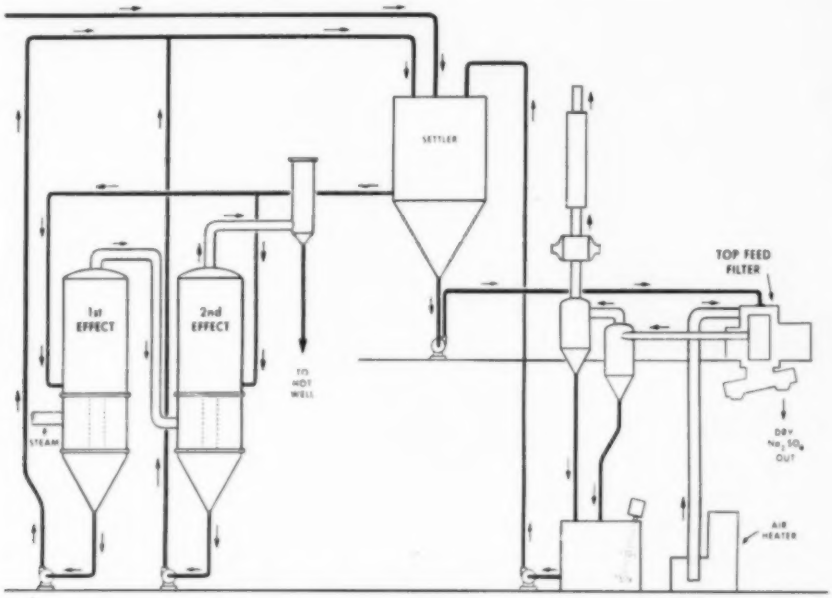
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from viscose rayon spent spin bath

for its extremely low entrainment loss.

Further evaporation, filtration, and drying converts the Glauber salt to more valuable anhydrous sodium sulfate.

Perhaps you have a problem of concentration, recovery, or waste disposal with which Swenson engineers can help you. Their experience has led to process simplification as well as greater economies in the use of heat, power, and materials. We invite you to use their engineering skill for your problems.



SWENSON

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has been developed to an unparalleled degree in A.C.F. tank car building. This giant planer, in a single operation, cuts to width, trues the noses, bevels the upper and lower edges and two sides of the plate. It facilitates automatic welding in swift assembly-line production of all-welded tank cars that are better, stronger. See how A.C.F. standard designs for all services fit into your shipping scheme. It's the *tonnage dependable* answer to your transportation problem.

American Car and Foundry Co.

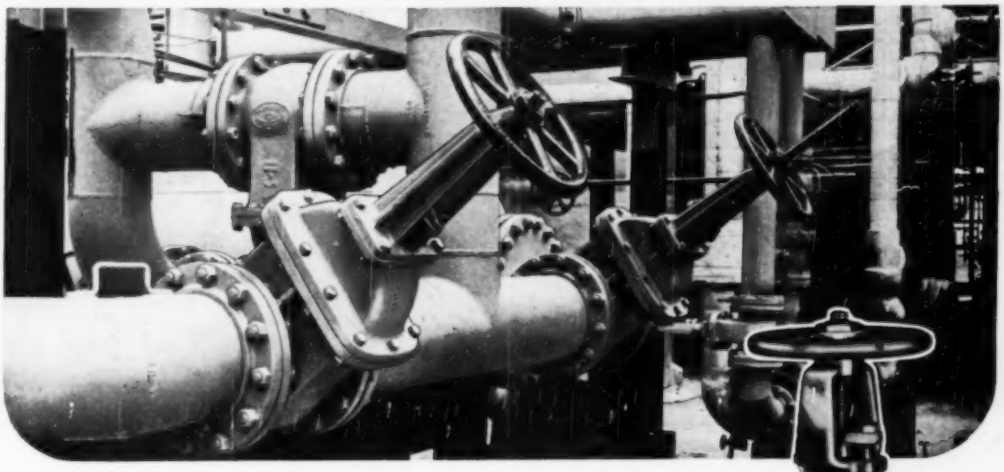
"Quality and Vision in Railroad Transportation"

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ALOYCO STAINLESS STEEL VALVES



by the hundreds in *Celanese** Chemcel Plant



THE CHEMCEL PLANT of the Celanese Corporation of America at Bishop, Texas, is notable for its extensive use of stainless steels. Towers, condensers, pumps, valves and other equipment are constructed largely or entirely of these durable metals, only after the most careful analyses.

And in this largest of plants for the commercial production of organic chemicals by the direct oxidation of propane and butane gases, there are hundreds of Aloyco Stainless Steel Gate Valves, Globe Valves and Check Valves. The photograph above shows a typical installation of Aloyco Gate Valves in the Chemcel Plant. The management says of it:

"The solution handled by this installation is 14% formaldehyde in water at approximately 200 degrees Fahrenheit, and in a recent inspection the internal surfaces proved to be in excellent condition after nearly one year's service."



Aloyco Gate Valve, No. 111, 150 lb. flanged, F and D. Sizes ½"-12" inclusive. Available in 18-8S, 18-8SMo, Aloyco 20 and other corrosion-resisting alloys.

ALOYCO

STAINLESS STEEL
VALVES AND FITTINGS

GATE, GLOBE, Y, CHECK, TANK, SAMPLING AND Y-PORT VALVES
SCREWED AND FLANGED FITTINGS

ALLOY STEEL PRODUCTS COMPANY, INC.

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Specify Aloyco Stainless Steel Valves, to increase your own process pipe-line efficiency and reduce maintenance costs.

*Reg. U. S. Pat. Off.



hard water is

Good enough for drinking—

but not for spraying weeds!



Now Pittsburgh Iminol-D

stabilizes 2,4-D Amine Solutions and prevents hard water precipitates

The effective use of concentrated 2,4-D amine solutions for weed control has been made difficult, and sometimes impossible, in many agricultural regions because of *hard water* conditions. But *now* the precipitation of undesirable salts (caused by the dilution of concentrated 2,4-D amine solutions with "hard" water) can be avoided.

A new *Pittsburgh* chemical . . . IMINOL-D . . . when incorporated in 2,4-D concentrates at the time of formulation, not only prevents nozzle-clogging precipitates but also increases the wettability and effectiveness of the spray. Precipitation protection lasts for an adequate period after hard water dilution.

Since many of the richest agricultural areas in the country have water classified as hard or very hard, the introduction of Pittsburgh IMINOL-D is a development of significant importance to herbicidal spray manufacturers.

Full technical information is available in bulletin form. Write for *Pittsburgh* IMINOL-D Bulletin today!

PITTSBURGH AGRICULTURAL CHEMICAL COMPANY
Empire State Building • 350 Fifth Avenue • New York 1, New York

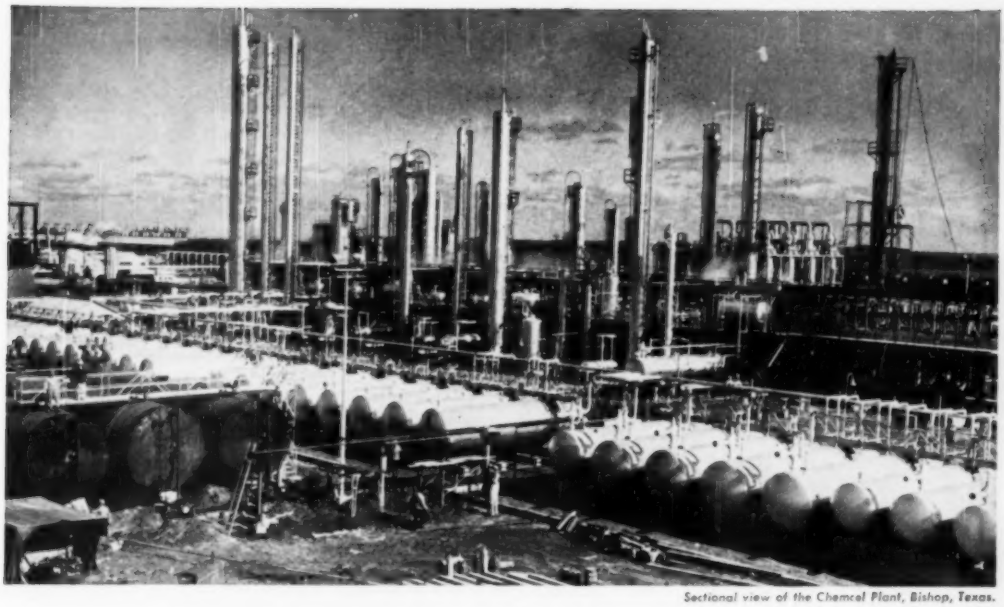
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Other "Pittsburgh" Chemicals

Activated Carbon
Alkyl Methyl Pyridinium Chloride
Alpha Naphthylthiourea
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Creosote
Cresol—Meta Para, Ortho
2,4-Dichlorophenoxyacetic Acid
Dinitro-Orthocresol
Isopropyl N-Phenyl Carbamate
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Naphthalene
Parathion
Para Amino Phenyl Mercuric Acetate
Phenol
Phthalic Anhydride
Picoline—Alpha, Beta and Gamma
Pipe Line Enamel
Pyridine—Medicinal and Industrial
Sodium Cyanide
Sodium Thiocyanate
Sulphate of Ammonia
Sulphuric Acid—60°, 66° and Oleum
Tar Acid Oil Disinfectants
Tar—Crude and Road
Toluol—Nitration and Commercial
Xylol—10°, 5° and 3°

COAL CHEMICALS, ACTIVATED CARBON, NEVILLE COKE, EMERALD COAL, PIG IRON, GREEN BAG CEMENT, CONCRETE PIPE AND PRODUCTS



Sectional view of the Chemcel Plant, Bishop, Texas.

CHEMCEL *geared to Industry*

At its Chemcel plant, near Corpus Christi, Texas, Celanese has incorporated the most advanced engineering techniques for synthesizing organic chemicals from petroleum gases. The result is a flexible plant that can be geared readily to the changing needs of chemical markets. Tank cars carry vital organic compounds daily from Chemcel to industries throughout the nation. This past year, with the completion of storage terminals at Corpus Christi and New Haven, Celanese inaugurated the first tanker movements of formaldehyde—from Chemcel to New England.

While serving today's chemical markets, Celanese keeps an eye to the future through its intensive research program. Begun 16 years ago, this program has resulted in the production of an expanding group of important commercial compounds and new chemicals. Another achievement is represented by the recent completion of the Celanese Petroleum Chemicals Research and Development Laboratory at Clarkwood, Texas. Here, engineers and skilled technicians are working continuously to improve plant processes, to find new applications for current Celanese Chemicals and to develop additional compounds for production at Chemcel.

Celanese is a major producer of formaldehyde, acetaldehyde, methanol, acetone, acetic acid and other organic chemicals. Write for the latest brochure describing these Celanese Chemicals. And, for the organic compounds you need now and will need, look to Celanese.

CELANESE CORPORATION OF AMERICA
Chemical Division
180 Madison Avenue, New York 16, N. Y.

Celanese* CHEMICALS

*Reg. U. S. Pat. Off.

ALDEHYDES • ALCOHOLS • ACIDS • SOLVENTS • GLYCOLS • KETONES • PLASTICIZERS

How Mohawk Carpet Mills

CUTS COSTS, INCREASES PRODUCTION

...by using General Electric Spectrophotometer to help solve color problems



Technician Donald Johnson makes a test with Mohawk's General Electric spectrophotometer.

You, like Mohawk's J. J. Hanlon, may be able to cut costs by using a G-E spectrophotometer to set up color standards and to control color of dyes and of textiles in production. Or use the spectrophotometer in your plant for controlling color of paints, glass, inks, and paper, or in your laboratory for chemical, pharmaceutical, and medical analysis.

CUTTING COSTS

Assistant superintendent of dyeing, Mr. Hanlon learned that dyeing costs were high on one of Mohawk's popular broadloom carpets. Several different dyes were used in preparing the color. Difficulty in matching the color sometimes caused costly delays in processing the batch. Then Hanlon went to work with the G-E spectrophotometer, used for more than six years in helping to solve Mohawk's color problems.

"Color analysis on this problem," says Hanlon, "showed how to match the standard with just two dyes instead of several. Now we match the standard more quickly than before, and have *doubled* the amount of wool dyed at one time. And by eliminating the delays we ran into when using several dyes for the color, we have a more efficient operation."

A G-E Instrument for Your Problem

Your problem may even justify developing a new instrument, particularly if the problem is a common one. Write today to Apparatus Dept., Section 687-2, General Electric Company, Schenectady 5, N. Y.

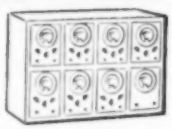
General Electric testing and measuring equipments for nearly every industrial process



Coil Testing



Time, Speed and Torque



Force, Strain and Thickness Gages

To Develop Improved High-speed Machinery . . . study breakage or motion with aid of G-E Photolight

By enabling the camera to photograph high-speed mechanical motion, the photolight provides a quick, easy, and accurate means of studying problems of breakage or motion in both large and small high-speed machines.

For example, with the aid of the photolight scientists have developed better circuit breakers and relays, projectiles, turbine rotors, shotgun shells, and many other equipments operating at high velocity.

The new G-E photolight provides a high-intensity flash of blue-white light with a duration of two microseconds or less for use in open-flash photography. Objects have been photographed moving as fast as 2700 feet per second. Write for GEC-337.

To Increase Life of Equipment . . . check for excessive vibration with General Electric's recording vibrometer

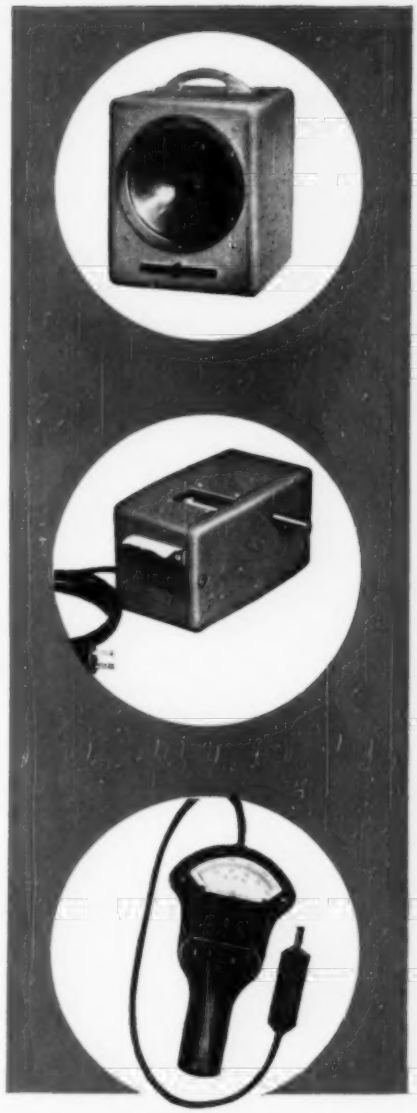
You can safeguard the life of high-speed machinery such as steel mill rolls or printing presses by using the G-E recording vibrometer to measure excessive vibration in bearings, shafts, and gear trains, or to test motors, compressors, fans, blowers, and pumps. The instrument records on waxed paper both the amplitude and frequency of vibration.

These are a few of the applications where the recording vibrometer will cut your design and maintenance costs. Write for GEC-310. For data on other vibration measuring equipments, ask for GEC-4140.

To Measure Rotational and Linear Speeds . . . use the G-E Hand Tachometer for accurate readings

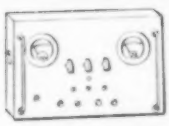
You can easily and accurately check for motors that are running over- or underspeed with the aid of the G-E hand tachometer. You can also use it to measure cutting speeds of lathes and milling machines, and linear speeds of planer beds, shapers, band saws, and conveyor belts.

Built with a two-foot electric cable for reaching into out-of-the-way places, the hand tachometer has an accuracy of plus or minus 1%, and the head is not affected by machine vibrations or temperature changes. You can adjust the speed-range with a flick of the thumb, without removing the spindle from the rotating shaft. Write for GEC-241.





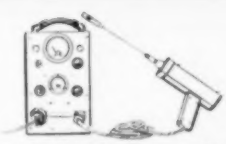
Materials Testing



Chemical Analysis



Insulation Tester



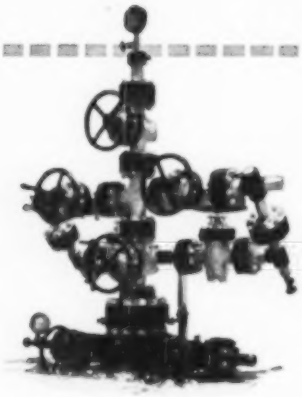
Leak Detector



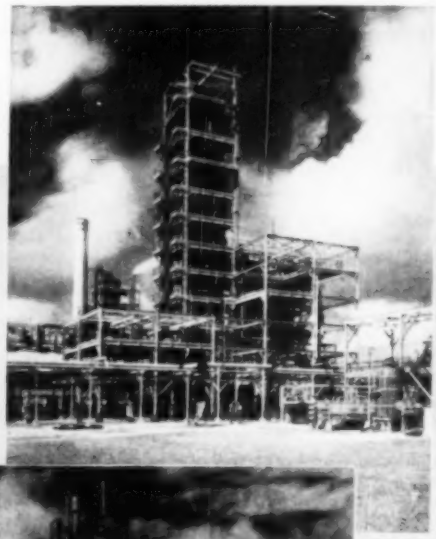
Vibration and Sound

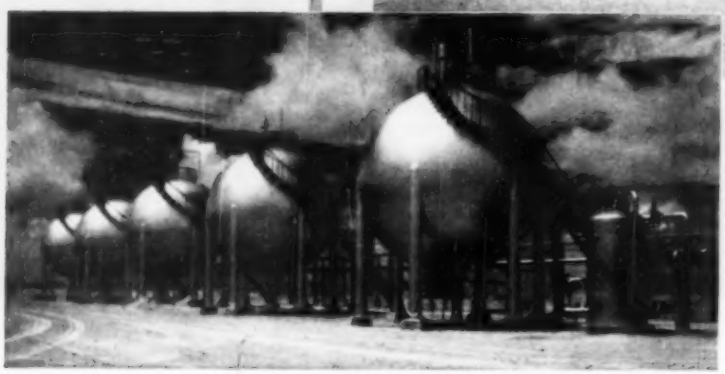
GENERAL ELECTRIC

FROM WELL HEAD to FINISHED PRODUCTS



Our work for the process industries includes engineering design and construction of a wide range of installations for natural gas, refining and chemical operations from well head to finished products.





STONE & WEBSTER ENGINEERING CORPORATION

A SUBSIDIARY OF STONE & WEBSTER, INC.

Size of Machine	Net Volume of Chamber Cu. Ins.	Approximate Capacity Stiff Paste Pounds per Batch Factor x Specific Gravity	Motor Horsepower Standard and Double Speed	Approximate Floor Space Length	Width
B	103	Sp. Gr. x 2.5	Four Speed 8½/12½ 17/25	8'0"	3'0"
00	263	Sp. Gr. x 4	15/30	10'0"	4'6"
1	1193	Sp. Gr. x 24	50/100	12'0"	5'10"
1-A	1193	Sp. Gr. x 24	50/100	14'8"	6'0"
3-A	4315	Sp. Gr. x 100	150/300	23'0"	10'0"
3-A Uni-Drive	4315	Sp. Gr. x 100	150/300	25'0"	10'6"
11	14940	Sp. Gr. x 300	300/600	34'0"	13'6"
11 Uni-Drive	14940	Sp. Gr. x 300	300/600	32'3"	11'0"

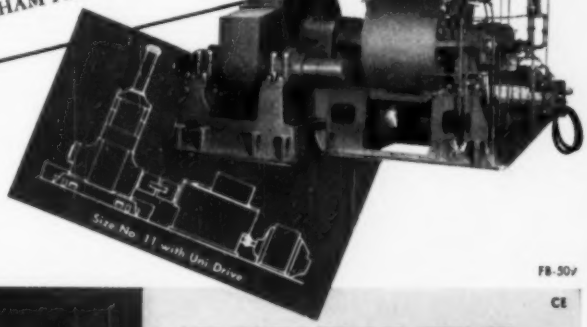
THERE'S A BANBURY SIZE TO SUIT YOUR NEEDS EXACTLY

Banbury mixers are made in eight standard sizes for processing plastics, from the size B for laboratory or small production work to the No. 11 with its net chamber capacity of 14,940 cubic inches. With such a range of machines to choose from, you can select the mixer that will provide the production you require.

Furthermore, Farrel-Birmingham engineers have developed other production units, such as extruders, warming and sheeting mills, and calenders, which are *matched in capacity* with the various sizes of Banburys. This means that a layout can be *engineered* that will eliminate the "choking" or "starving" of any machine in the line. Production can be *designed* to flow without costly interruptions and with manual aid and supervision reduced to a minimum. Isn't this worth investigating?

Before you purchase new processing equipment, call in a Farrel-Birmingham engineer. In the meantime, send for a copy of *NEW* bulletin, "FARREL-BIRMINGHAM PROCESSING MACHINERY."





FB-50r

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Plants: Ansonia and Derby, Conn.; Buffalo, New York
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FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONN.

Please send me, without cost or obligation, a copy of your new bulletin No. 188 "FARREL-BIRMINGHAM PROCESSING MACHINERY."

Name..... Title.....

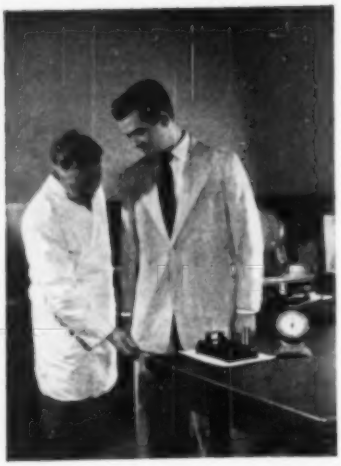
Company .....

Address .....

City..... State.....

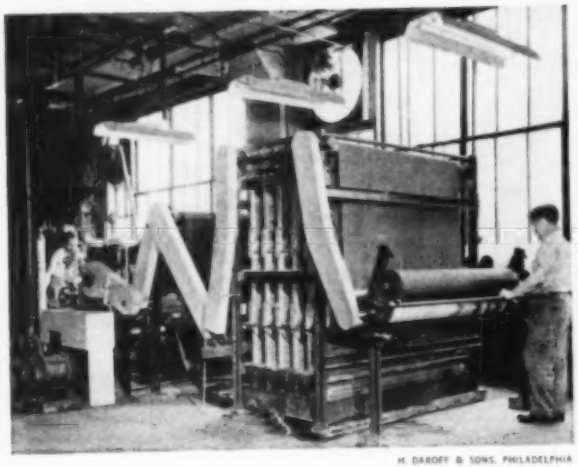
Life ...on the





CYANAMID'S new SUPERSET® Resin Finish—the first wrinkle-resistant finish which can be applied successfully to cotton and rayon with little or no loss in tensile strength, is here being tested. Picture at far left shows young man's jacket being twisted severely to induce as many wrinkles as possible. Second picture shows the same jacket after it has been shaken out and the young man has put it on—practically wrinkle-free and perfectly wearable.

Fabrics treated with SUPERSET Resin Finish will withstand repeated laundering and dry cleaning without loss of their wrinkle-resistant properties. This premium textile finish is just one of many which Cyanamid has developed to improve the quality of textiles.



H. DAROFF & SONS, PHILADELPHIA

GREATER FABRIC SOFTNESS and improved pre-shrinkage of woolens are now obtainable at low cost when clothing manufacturers use demineralized water in processing their fabrics. Because the treated water is essentially free of dissolved minerals, it penetrates the fabric more thoroughly during wetting out, thus improving pre-shrinkage and, as it leaves no deposit on the fabric, the wool is much softer. Cyanamid's FILT-R-STIL® Demineralizers are most efficient and economical producers of mineral-free water for this and many other industrial purposes. Unlike stills, they require no heat, involve no scale problem, and are turned on and off like a faucet.



REDSOL® CRYSTALS (potassium sodium ferricyanide) are finding increasingly wide use in the photographic industry as a toner, reducer and mild oxidizing agent. This is but one of a group which makes Cyanamid headquarters for Prussiates. Included are REDSOL B Solution (sodium ferricyanide), the most economical of all the commercial ferricyanides and useful as a mild oxidizing agent: Yellow Prussiate of Soda, and Yellow and Red Prussiate of Potash.

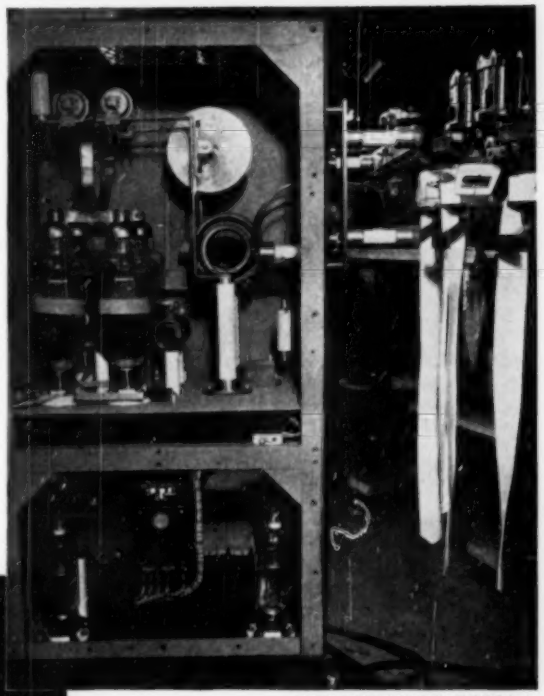
Chemical Newsfront

NOW AVAILABLE in commercial quantities are Cyanamid's AERO** DOP (Di-2-Ethyl Hexyl Phthalate) and AERO DOPI (Di Iso Octyl Phthalate) for plasticizing vinyl resins. These high quality plasticizers combine many desirable properties: low heat loss, low brittle point and good compatability. They remain liquid down to temperatures in the neighborhood of minus 50° C, assuring flexibility of the vinyl over an extreme temperature range.

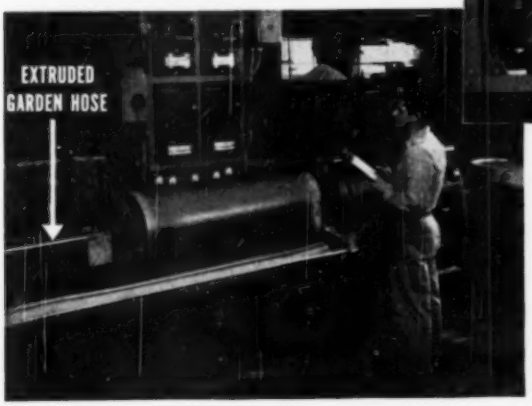
Two typical uses of AERO DOP and AERO DOPI are shown here: a plasticizer for extruded tubing and for ladies' vinyl resin belts (being electronically sealed in photo). These plasticizers are also ideal for use in vinyl resins for raincoats, handbags, shoe products, upholstery, drapery materials, shower curtains, coated fabrics, beach mattresses and adhesives. Films thus plasticized retain their flexibility through years of service. Furthermore, the outstanding electrical properties of these plasticizers make them ideal for use on vinyl resins for wire-coating.

AERO DOP and AERO DOPI give vinyl resin-coated products the extra toughness, smoothness, dryness and bright coloring which are strong sales features. From the processing standpoint, AERO DOP and AERO DOPI improve the working qualities of vinyl resins, making them more adaptable to modern, low-cost production techniques.

*Reg. U. S. Pat. Off. **Trademark



INDUSTRIAL SYNTHETICS CORP., GARWOOD, N. J.



WRITE FOR LITERATURE. If you would like further information on products mentioned, check off below and mail.

- ☐ SUPERSET Resin Finish
- ☐ FILT-R-STIL Water Demineralizers
- ☐ REDSOL Crystals, Red Prussiate of Potash, REDSOL B Solution
- ☐ AERO DOP and AERO DOPI

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Company .....

Address .....

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C E 4-49

AMERICAN Cyanamid COMPANY

30 ROCKEFELLER PLAZA · NEW YORK 20, N. Y.



Modern Techniques Employed by KOPP GLASS, INC. Illustrate Effective Utilization of GAS

ENGINEERED GLASS—produced for signal, technical, and industrial purposes—involves small-batch operations and specialized glass-making practices. At Kopp Glass, Inc., Swissvale, Pa. engineers have applied modern production machinery to these highly technical processes, utilizing flexible GAS for all heating requirements.

As large users of fuel, Kopp executives are concerned with the operating economies made possible by effective utilization of GAS in modern Gas-fired Equipment. But equally important is the automatic controllability of GAS for the varying temperatures used for melting, annealing, tempering, mould heating, in this specialized glass business. The importance of GAS in the Kopp plants is stressed by the wide range of equipment using this efficient fuel—

- 2 pot-type regenerative furnaces
- 2 special heat treating lehrs
- grinding and polishing plate heaters
- 4 day tank furnaces
- 3 annealing lehrs
- 1 mould oven
- 2 pot arches
- 2 ring ovens
- 1 cut-off machine
- 1 trial-pot furnace

In commenting on the use of GAS for heat-processing in the manufacture of engineered glass, supervisor of Equipment J. B. Fullen says, "The automatic controllability and the speed of GAS are of great importance, but we can't overlook the cost of fuel in our type of operation. That's why we use every device for effective utilization of GAS."

Molten glass from the Gas-fired regenerative furnace (rear) is placed in the mould for pressing.

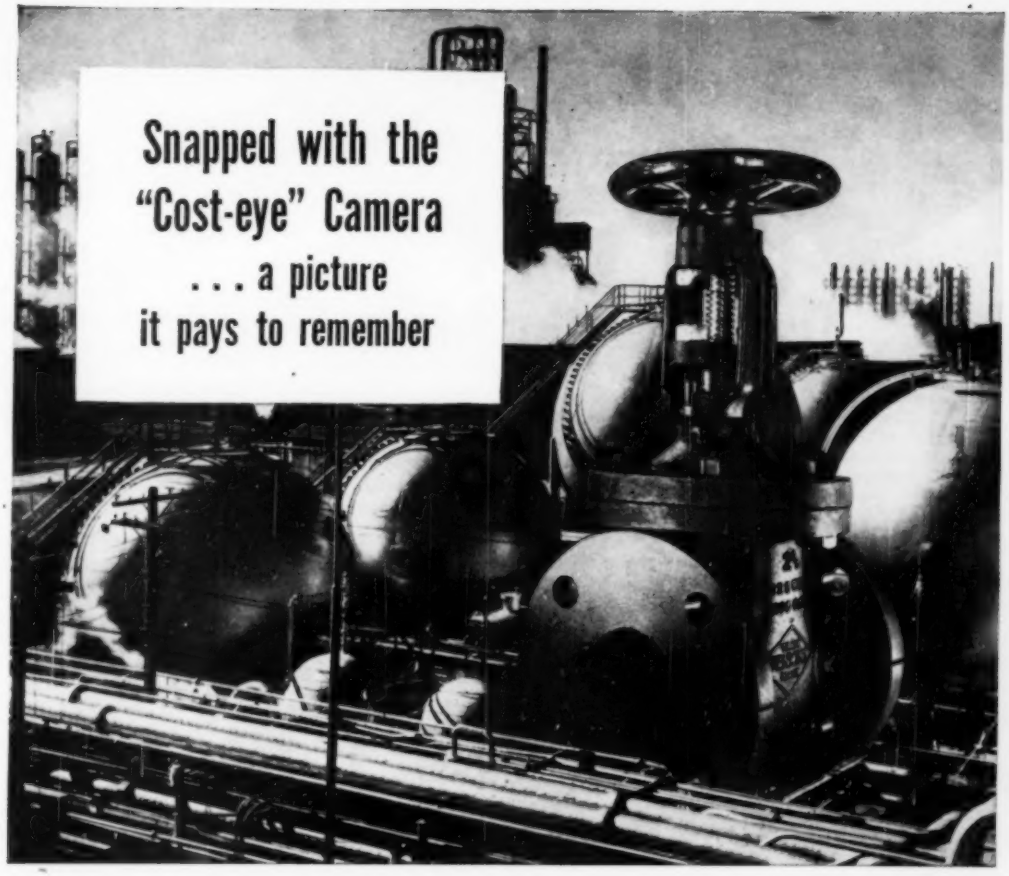


Continuous Lehr in which GAS is used for annealing signal and industrial glass products.

You'll find it worthwhile to investigate modern Gas Equipment for heat-processing in glass manufacturing.



AMERICAN GAS ASSOCIATION
420 LEXINGTON AVENUE, NEW YORK 17, N.Y.



IF A CAMERA could be constructed with an eye to costs, this is the picture you'd get of a synthetic rubber plant. By showing *all valves* as *one valve* it brings into proper perspective the valve investment in *any* plant, *any* large building where operation involves fluid control. Collectively, valves represent a major expenditure . . . yet too often, they are selected with "petty cash" consideration.

IT WILL PAY MANAGEMENT to keep this picture in mind. With wages and material costs the highest ever, valve maintenance costs must be watched as carefully as operating expense of larger plant units.

EXCESSIVE MAINTENANCE of one inferior valve is insignificant, but multiplied by thousands, it is a serious drain on operating budgets.

JENKINS BROS. helps you meet this problem two ways. First, by building extra endurance into Jenkins Valves, making them the longest-lasting, lowest-upkeep valves that money can buy. Second, with advice from Jenkins Engineers on any question of proper selection, installation, inspection or maintenance.

For all new installations, for all replacements, rely on Jenkins quality and engineering for lowest valve costs in the long run. *Sold through leading Industrial Distributors everywhere.*

•

Jenkins Bros., 80 White St., New York 13; Bridgeport, Conn.; Atlanta; Boston; Philadelphia; Chicago; San Francisco. Jenkins Bros., Ltd., Montreal.



"PREVENT VALVE FAILURE" is a 28-page guide to valve economy, fully illustrated, with case histories of valve damage, and recommendations for its prevention by proper selection, installation, inspection, and maintenance. FREE on request. Write: JENKINS BROS., 80 White St., New York 13, N. Y.

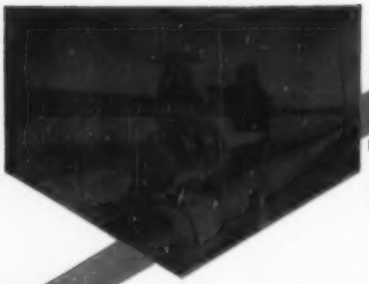
LOOK FOR THIS JENKINS DIAMOND MARK

SINCE 1864

JENKINS VALVES

Types, Sizes, Pressures, Metals for Every Need





3000 feet of concrete-lined 12-inch steel pipe above ground and 14,000 feet of 12-inch transite underground carry 800 gpm of brine from Lake Searles to the plant.

Another Chemical Plant well-built

This modern soda-ash plant, complete from pipeline to packer, was designed and built by Fluor for the American Potash & Chemical Corporation, as a supplement to their Trona, California works.

Death Valley heat and drouth complicated—but could not prevent—efficient and competent handling of this construction job by Fluor engineers.

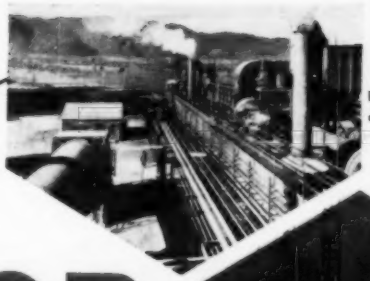
A desert, swamp, or snow-swept highland is often the only economic location for a chemical, petroleum, or power plant. In 50 years of designing and building for worldwide industry, Fluor has grown expert in efficient procedure under any adverse conditions.



Last step in the evolution of Lake Searles brine into pure soda ash.

photos by Rod Yould and AP&CC

In this new plant, brine from the lake is carbonated with flue gas from the power house plus recycled carbon dioxide; the resulting bicarbonate is dried and calcined; the resulting carbonate is bleached, recrystallized, filtered, dried, screened, and eventually bulk loaded or packed in bags. The process is continuous with an annual capacity of 60,000 tons of soda ash and 30,000 tons of borax.



Careful planning is evident in the layout of equipment, pipeways, and access platforms.

by FLUOR

THE FLUOR CORPORATION, LTD.

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SAN FRANCISCO



Carbonators, crystallizers, and evaporators were too large in diameter to move by train and had to be trucked in. Fluor rigging equipment took over, once the huge vessels arrived at the site.

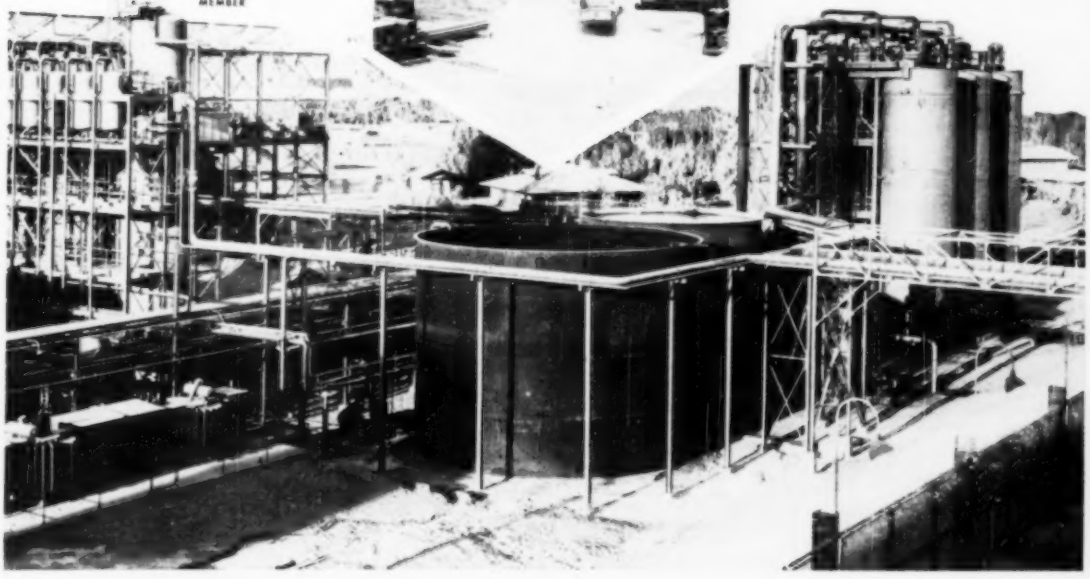
now is the time | *Your new plant facilities may be more profitable to build today, because Fluor's present engineering and construction costs are substantially lower. Let us tell you why* ***Now*** *is the time.*

BE SURE WITH FLUOR

MEMBER



Fluor engineers utilized an ingenious way to get this 80-ton calciner in place. Foundations were poured, then 15 feet of earth fill was moved in by dozer and truck. On top of the fill, a spur track was laid to carry the giant. The same track also carried three hefty 60-ton driers. Track and fill were then removed.



Vibration Control



Columbian Humming Birds, one of the famous drawings from nature by John James Audubon.

Wing vibration, nimbly controlled, keeps the humming bird in flight, enables it to feed without alighting.

Electric vibration is the essence of telephone transmission. Voice, music, pictures, teletype—no matter what type of signal—the story is told by the frequency and strength of not one, but many vibrations.

Learning how to control electric vibrations to pin-point accuracy has been one of the basic jobs of Bell Laboratories scientists in their development of the "carrier" art which enables the sending of many more conversations over existing wires. Among their inventions have been oscillators, modulators, filters, coaxials, wave-guides, and radio lenses.

Constantly Bell Laboratories scientists discover new and better ways to control and adapt electric vibrations by wire or radio to the needs of the telephone user. Their pioneer work in this field is one important reason behind today's clear, dependable and economical telephone service.

BELL TELEPHONE LABORATORIES

Exploring and inventing, devising and perfecting, for continued improvements and economies in telephone service.





"Head-plus-hand" Service Results in a Two-way Approach to your Adhesive Problems

What do you need . . . facilities for research . . . or highly specialized equipment for production?

Flintkote has both . . . at your service.

If you make a product that requires an adhesive with special characteristics . . . check into the Flintkote line. You'll find a versatile list of latex compounds, aqueous dispersions of rubbers and resins and solvent cements. You'll find products for bonding and laminating . . . as well as coating, saturating and sizing.

Chances are, you'll find just what you need. If not, our complete research facilities are at your disposal. We'll be glad to work with your staff, or independently, to develop *exactly* the product you require.

Flintkote's modern plants are ready to go to work for you with highly developed production facilities to assure delivery of *what* you need *when* you need it.

Take advantage of this heads-for-research, hands-for-production policy. Save yourself time, effort and trouble. We'll be glad to supply you . . . by the drum or by the tank car . . . with standard or special products. Write today outlining your requirements.

THE FLINTKOTE COMPANY, *Industrial Products Division*
30 Rockefeller Plaza • New York 20, N.Y.
ATLANTA • BOSTON • CHICAGO HEIGHTS • DETROIT • LOS ANGELES
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FLINTKOTE
Products for Industry

FOR YOUR INFORMATION



LOW-COST PLASTICIZER

now available in quantity

Santicizer® 160 is now available at reduced prices—for immediate shipment in any quantity. Since it is less expensive than any other plasticizer of comparable quality, Santicizer 160 will help you reduce compounding costs, yet maintain excellent performance characteristics.

Santicizer 160 combines many plasticizing advantages . . . It makes possible economical reductions in processing temperatures for vinyl films, sheetings, extrusions and floor tiles—lowers burning rates of these materials.

Complete information and samples of Santicizer 160 will be sent immediately upon request. Contact any District Sales Office, write or note your request on the coupon on opposite page. Ask also for your copy of "Monsanto Plasticizers," a new, comprehensive treatise on plasticizing action, applications and performance results of Monsanto plasticizers.



ADVANTAGES OF SANTICIZER 160

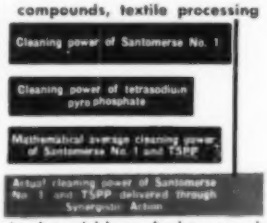
1. Low Cost (recent reduction makes it lowest-priced plasticizer of comparable quality).
2. Excellent Processing Action (enables lower calendering temperature or faster rates of operation).
3. High Tear Strength.
4. Low Burning Rate (less flammable than most phthalate-type plasticizers).
5. High Tensile Strength.
6. Readily Available in Quantity.

Dependable Source of Supply

Monsanto's basic position on raw materials assures a steady supply of highest-quality plasticizers. Consult Monsanto technicians . . . They are especially qualified to assist you in any problems in this field.

SYNERGISTIC ACTION GIVES HIGH DETERGENCY AT REDUCED COST

Santomerse® No. 1 and TSPP improve efficiency of cleaning compounds, textile processing



A substantial bonus in detergency is available at lower cost by employing the synergistic action of two Monsanto products — Santomerse No. 1 and tetrasodium pyrophosphate. What is synergistic action? Suppose, for example, you mix Santomerse No. 1, a product of high detergency, with TSPP, having lower cleaning power, you naturally expect effectiveness that strikes an average of the two. Actually, however, the result is detergency higher than the average . . . higher than the cleaning power of either product. This co-operation of the two Monsanto products, bringing a bonus in effectiveness, is synergistic action.

Since TSPP is priced even lower than economical Santomerse No. 1, the use of the mixture lowers costs while delivering higher detergency.

Look into the possibilities of synergistic action in reducing your costs while increasing the efficiency of industrial cleaning compounds and textile cleaning and scouring operations. For details, contact the nearest Monsanto District Sales Office, write, or note your request on the coupon.

GOOD AVAILABILITY

Prompt delivery of Santomerse No. 1 or TSPP can be made from the nearest of thirteen conveniently located producing and shipping points.

THESE INTERMEDIATES OFFER HELP IN YOUR DEVELOPMENT PROBLEMS

If you are looking for ways to improve your products, or to develop new ones, try the four Monsanto intermediates described here . . . They may readily help you reduce production costs, increase profits, or even open wide new business frontiers.

If your research develops uses for any of these Monsanto products, you can be sure of ample supply at reasonable prices. Samples for test purposes will be furnished promptly without charge.

para-AMINOBIPHENYL, TECHNICAL

SPECIFICATIONS

Appearance and Color: Yellowish-brown crystalline mass. **Crystallizing Point:** 50.5°C. min. (Indicates purity of 94.5% *para*-Aminobiphenyl min.)

ADDITIONAL PROPERTIES

Distillation Range:
First drop, 325.0° C. min.; 1-96 ml., 8.0°C. max.; 100% (First drop to dry point), 10.0°C. max.; Dry point, 340.0°.
Specific Gravity: (60.0°C./15.5°C.) approx. 1.06

POSSIBLE APPLICATIONS

Intermediate in dyestuff synthesis; organic and pharmaceutical synthesis; synthesis of insecticides.

para-NITROBIPHENYL

SPECIFICATIONS

Appearance and Color: Brown, crystalline solid. **Crystallizing Point:** 110.0°C. min.
Composition From Vacuum Distillation:
para-isomer, 94.0% min.; *ortho*-isomer, 6.0% max.; High boiler, 1.0% max.

ADDITIONAL PROPERTIES

Specific Gravity: approx. 1.154
Boiling Point: approx. 340°C. (At atmospheric pressure)
Flash Point: approx. 164°C. (Tag open cup).
Fire Point: approx. 189°C. (Tag open cup).

POSSIBLE APPLICATIONS

Intermediate in dyestuff synthesis; organic and pharmaceutical synthesis; synthesis of insecticides.

BENZYL CHLORIDE

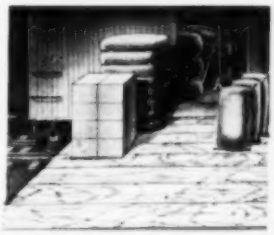
SPECIFICATIONS: (For anhydrous liquid and material recovered from stabilized solution.)

Appearance and Color: Colorless to light-yellow liquid.
Specific Gravity: 1.104-1.108 at 15.5°/15.5°C.
Distillation Range: First drop, 177.5°C. min.; 95% (1-96 ml.), 3.0°C. max.; Dry point, 185.0°C. max.

ortho-NITROCHLOROBENZENE

SPECIFICATIONS

Appearance and Color: Greenish-yellow crystalline mass. **Crystallizing Point:** 31.7° C.



PENTA CHLOROPHENOL preservative

Santophen* 20 provides clean, long-lasting protection for all types of wood construction

Wood properly treated with Penta is CLEAN and STAYS CLEAN. It resists leaching even under conditions of high humidity or moisture; is paintable when formulated with suitable carrier oils. This non-bleeding quality of Penta is especially important where people or packaged goods come in contact with wood . . . It will not stain; has no objectionable odor.

Penta's high toxic value assures years of dependable protection against exposure, wood-rotting fungi, termites and other wood-boring insects. This toxicity never varies, since the chemical characteristics of Penta are always constant, always laboratory-controlled.

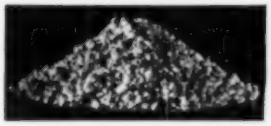
The Penta treatment, by either pressure or open-tank method, is simple. To learn more about its advantages, send for your copy of a new Monsanto folder, "Monsanto Pentachlorophenol for Preserving Wood in Industrial Construction."

Where Penta Makes Wood Last Longer

Platforms and Decking • Loading Docks • Catwalks and Railings • Ice Plants and Storage Houses • Grandstands and Stadium Buildings • Warehouses and Granaries • Tool and Machinery Sheds • Trestles and Bridges • Guardrails • Utility Poles • Signs and Billboards • Factory Flooring • Sills, Plates, Joists • Rafters and Roofing • Sash and Doors • Ladders and Stairs.

*Reg. U. S. Pat. Off.

SANTOBRITE DUSTLESS PELLETS SIMPLIFY HANDLING, STORAGE



Sodium Pentachlorophenate, Tech., has many uses as industrial preservative, fungicide, herbicide

Santobrite* is now available as pellets. Among the several advantages of this new form are: elimination of dusting, rapid solution in water, ease of handling, less storage space requirements per pound . . . The pellets are designed chiefly for the comfort of those who have found Santobrite dust bothersome. Santobrite will still be available in powder and briquette forms.

Santobrite is an industrial preservative, fungicide and herbicide with a wide range of applications, including the control of slime and algae in cooling water systems. If you are not already familiar with this and other important uses, write for full information . . . Samples for test purposes will be furnished without charge.

☆ ☆ ☆

MONSANTO CHEMICAL COMPANY, Desk D, 1702 South Second Street, St. Louis 4, Missouri. District Sales Offices: Birmingham, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle. In Canada, Monsanto (Canada) Ltd., Montreal.

MONSANTO
CHEMICALS — PLASTICS

Serving Industry . . . Which Serves Mankind

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Please send me more information on:

Name _____ Title _____
Company _____
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AVOID THE LUXURY TAX

on Idle Horsepower



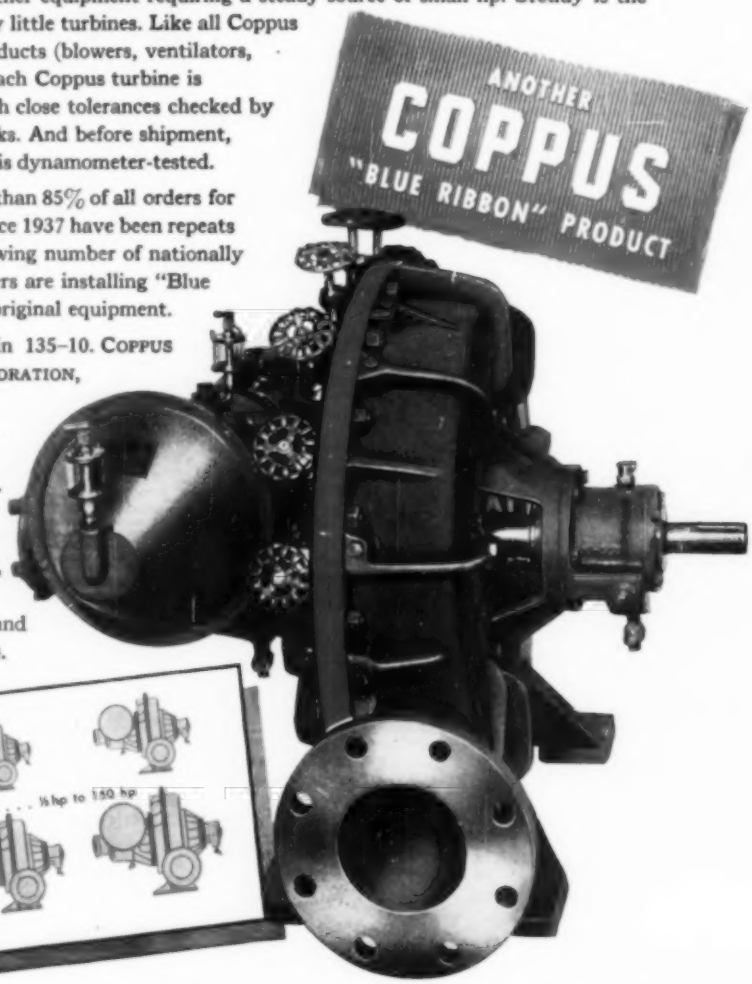
When your horsepower needs are small, why pay the extra cost of larger turbines, designed for much more power than you require?

You pay only for the horsepower you need when you fit the right Coppus "Blue Ribbon" Turbine to the load. They're made in six frame sizes . . . from 150 hp down to fractional . . . priced in proportion to their size.

That's why you'll see more and more Coppus turbines powering pumps, blowers, fans, stokers and other equipment requiring a steady source of small hp. *Steady* is the word for these busy little turbines. Like all Coppus "Blue Ribbon" products (blowers, ventilators, gas burners, etc.) each Coppus turbine is precision-made, with close tolerances checked by Johansson size blocks. And before shipment, the turbine you get is dynamometer-tested.

No wonder more than 85% of all orders for Coppus turbines since 1937 have been repeats . . . and that a growing number of nationally known manufacturers are installing "Blue Ribbons" on their original equipment.

Write for Bulletin 135–10. COPPUS ENGINEERING CORPORATION, 224 Park Avenue, Worcester 2, Mass. Sales Offices in THOMAS' REGISTER. Other products in BEST'S SAFETY DIRECTORY, CHEMICAL ENGINEERING CATALOG and REFINERY CATALOG.



The Election of November 2, 1948 GAVE NO MANDATE FOR SOCIALISM

The President and those who support his legislative program have objected to the substance of my previous editorial, which appeared under this headline: "Now is the Time to FIGHT SOCIALISM in Washington."

In that editorial I explained how Washington is poised to follow the disastrous policy of forcing industry to skimp on new plants and new equipment. That policy landed Britain in the numbing embrace of the Socialists. I cited the experience of Britain to show how such skimping on industrial tools can bring a nation to economic stagnation . . . and Socialism.

The President, in his recent Jackson Day speech, brushed aside this warning . . . "They are again trying to frighten the people with the old worn-out bugaboo that Socialism is taking over in Washington." Senator Francis J. Myers of Pennsylvania asserted that I was guilty of "warfare against any reasonable effort to keep our system of free enterprise working."

These criticisms may be sincere. But they are not well-founded.

I want to show why they are not well-founded by basing this editorial on Washington rather than Britain.

In Washington the Administration has proposed a legislative program, the key parts of which would clearly put the country far on the road to Socialism. Let us see how.

There are two steps in the process:

FIRST: The government by its taxation program undermines private industry so that it cannot provide itself with the necessary new plant and tools.

SECOND: The government itself steps in to provide the plants and equipment that it has blocked industry from getting. *That is Socialism.*

Here is how Washington is promoting Socialization of the steel industry—and of other industries.

Steel has been expanding its capacity and improving its equipment chiefly by plowing back its profits. During the last three years it has spent $1.4 billion for new plants and new tools. That was more than the companies had available from their own earnings. But profits provided more

continued on next page

than half of that money—more than $700 million. The remainder came from loans and from depreciation reserves set aside out of the earnings to replace worn-out equipment.

Profits must continue to provide the funds needed to pay for the bulk of the steel industry's necessary expansion. That is because private citizens, their income slashed by heavy taxes, have not been willing to buy steel stocks even at prices ruinously low for the companies and their present stockholders. The stock market currently prices the mills and other facilities of the nation's principal steel-producing companies at far less than fifty percent of the cost of reproducing them.

Let us take another example. Profits are essential to expansion in the electric light and power industry also. This year private companies are planning to buy $2 billion worth of new plant and equipment. To do that without going overboard in debt, they must sell to the public some $300 million worth of common stock. A squeeze on their profits would make that sale virtually impossible.

For tens of thousands of small business enterprises profits afford virtually the only practical source of funds for new equipment and expansion.

In the face of these and many other examples that might be cited, what is the most effective way to prevent industry from re-equipping itself and expanding is capacity to meet our essential needs?

Obviously, it is to cut down profits. And that is what the Administration is trying to do. The President has declared that steel prices are too high, and is demanding that Congress raise taxes sharply on all corporations.

There you have the first step toward socializing industry.

Next comes step two. Have the government supply the tools and equipment which, by taxation, it prevents industry from getting.

The Administration has proposed legislation to carry out this second step. It is called the "Economic Stability Act of 1949," for short, the "Spence Bill."

This bill gives the President the power to provide industrial facilities—in steel, power or any other industry—where he finds that a shortage is hampering or is likely to hamper the economy.

True, the bill says that the government is not to construct new plants if private companies will do it through government loans, on terms prescribed by the President. That may be just one step short of complete socialization. But it is only a short step. And the Spence Bill authorizes the government to take that step.

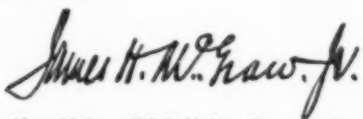
By itself, the Administration's "Stability Act" sounds harmless enough. It would have the government build plants only as a last resort. But it provides also that if private enterprise cannot turn out all the goods the country needs, the government can and should step in and provide the equipment to do it.

Now, take that power together with an Administration tax program that undercuts the ability of private enterprise to supply the new plants and equipment it needs out of its own earnings. That combination promotes government ownership and operation of industry.

And that is Socialism.

The American people, of course, have the right to live under any system they choose—Capitalism, Socialism, Fascism, Communism, or what-have-you. But before Socialism or any other "ism" is imposed upon us from above, the people should know the facts. If this editorial shall have contributed in some small degree to that end it will have served its purpose.

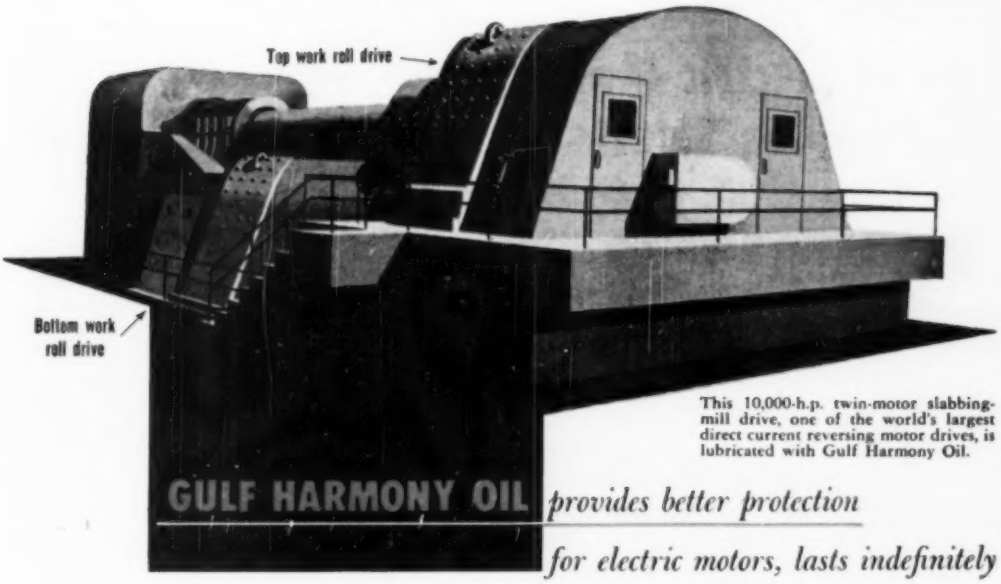
The election of November 2, 1948 gave no mandate for Socialism.



President, McGraw-Hill Publishing Company, Inc.

One of the many ways that

industry makes multiple savings with Gulf Quality Oils and Greases:



This 10,000-h.p. twin-motor slabbing-mill drive, one of the world's largest direct current reversing motor drives, is lubricated with Gulf Harmony Oil.

GULF HARMONY OIL *provides better protection for electric motors, lasts indefinitely*

In hundreds of plants from Maine to New Mexico, the preferred lubricant for electric motors is Gulf Harmony Oil. This outstanding oil is ideal for this important equipment—provides safe, sure, efficient lubrication, does not form harmful sludge deposits, lasts indefinitely. In ring-oiled motor bearings and in circulating systems the rust preventive properties of Gulf Harmony Oil insure against corrosion — keep bearings free of rust particles.

Typical of the acceptance by industry of Gulf Harmony Oil for electric motor lubrication is its use in the circulating system of the 10,000-hp. twin-motor drive on a large slabbing mill in the Pittsburgh area—one of the largest direct current reversing motor drives in the world. This mill reduces hot ingots to slabs for steel plate production. The motors are specially designed for this rugged service—are super-powerful, capable of quick starts, stops, and fast reversals.

Gulf Harmony Oil is one of more than 400 Gulf quality oils and greases that are helping plant operating men make multiple savings through improved production and lower costs. Make sure your plant is getting the advantage of all recent developments in petroleum science. Call in a Gulf Lubrication Engineer today.

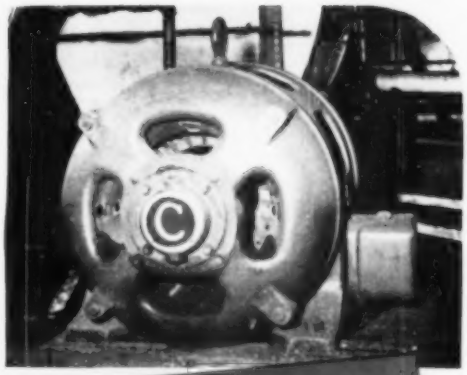
Gulf Oil Corporation · Gulf Refining Company

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GULF INDUSTRIAL LUBRICATION

Helps make machines produce more at lower cost

Century 40 horsepower, type SC motor driving an induced draft fan for a stack.

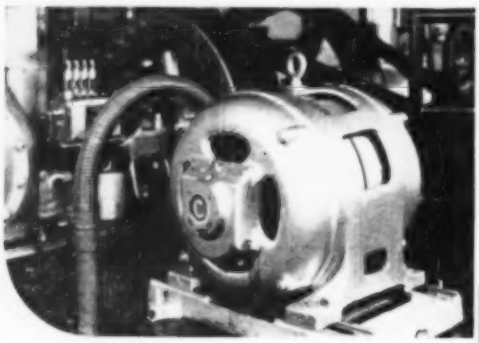


From Century's Line of Electric Motors You Can Select

1. **Right Kind**—*to match your current supply*
2. **Right Type**—*to meet your load characteristics*
3. **Right Protection**—*against atmospheric hazards*
4. **Right Size**—*from 1/6 to 400 horsepower*



Century 150 horsepower, type SC motor driving a two-stage centrifugal pump in a city water plant.



Two Century 75 horsepower SC high torque motors driving refrigeration compressors.

The wide range of kinds, types and sizes of Century motors makes it possible to select a standard motor to meet the requirements of all popular applications.

They are available for both AC and DC current—high, normal and low torque characteristics. Types are also available for applications requiring varying speeds and reversing direction of rotation.

To protect against atmospheric hazards, Century motors are enclosed in open rated drip proof, splashproof, totally enclosed fan cooled and explosion proof frames. Many types are available with vertical and flange mountings as well as standard horizontal bases.

Specify Century motors for all your electric power requirements.

Popular sizes and standard ratings are generally available from factory and branch office stocks.

Century C MOTORS

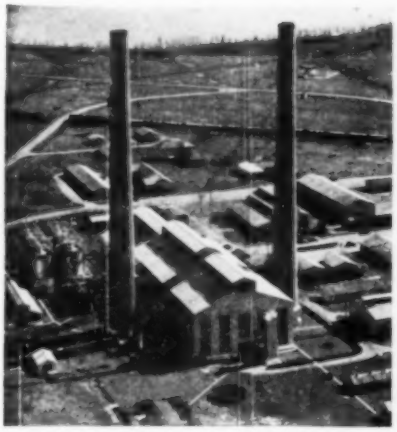
CENTURY ELECTRIC CO.
1806 Pine Street, Saint Louis 3, Missouri
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-624

SULPHUR

*Interesting Facts Concerning This Basic Raw Material from the Gulf Coast Region

*MINING



The process of mining sulphur, as developed by Herman Frasch, takes advantage of the fairly low melting point of sulphur (about 240° Fahrenheit). The process resolves itself into three parts: one, operating a power plant that heats and pumps to the field large quantities of water; two, distributing the hot water through wells to melt the underground sulphur, and raising the melted sulphur to the surface; three, cooling and solidifying the sulphur in large vats from which it is broken and loaded into cars for shipment.

The power plant and water reservoir, as well as the vats and permanent structures, are placed at some distance from the sulphur deposit to avoid possibility of damage from surface subsidence, resulting from extraction of the underground sulphur.

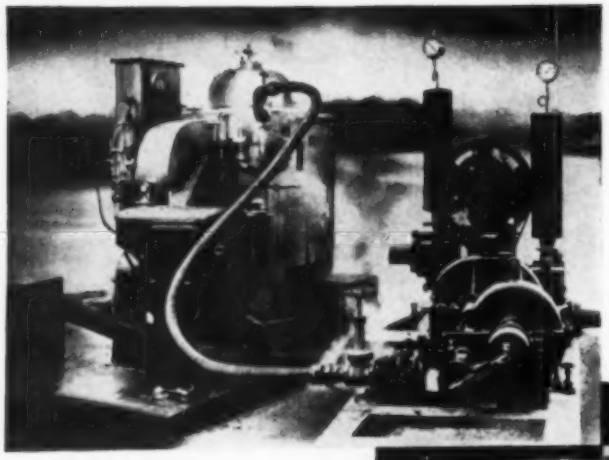
Loading operations at one of the huge vats of Sulphur at our Newgulf, Texas mine. Such mountains of Sulphur are constantly being built at our mines, from which shipments are continually made.



TEXAS GULF SULPHUR CO. INC.

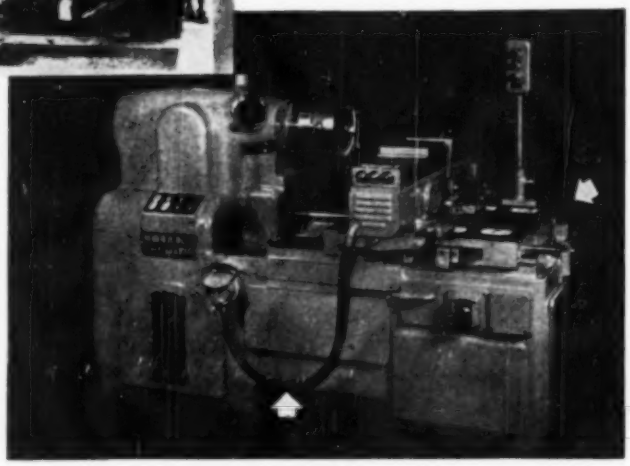
75 East 45th St. New York 17, N. Y.

Mines: Newgulf and Moss Bluff, Texas



Heavy Duty Bettis Steamer Drives Turbo-Pump Through American Metal Hose

This compact, fully automatic, skid-mounted, 100 h.p. Bettis Steamer (Bettis Corporation, Houston, Texas) supplies steam at 600 lb. p.s.i. to a portable, turbine-driven pump. The connector is American Interlocked Flexible Bronze Steam Hose of 2" I.D. Couplings are brass, heatproof male fitting at top of boiler and heatproof union at bottom.



Machine Tool Wiring Has Longer Life With Sealtite* Electrical Conduit

The smooth, plastic jacket extruded over the galvanized steel flexible lining of *Sealtite* Conduit, gives lasting protection to wiring exposed to moisture, oil, acid fumes, chemicals, grease and dirt. American Sealtite Conduit is available in long lengths to be cut and assembled *on the job* (which means *less scrap*). Made in I.D.'s from ⅜" to 2". Illustration shows Sealtite installed on a *Uni-Matic* lathe manufactured by the Monarch Machine Tool Company, Sidney, Ohio. *Trade Mark

...Call on American for Any Type of Flexible Metal Connector

You need American Flexible Metal Connectors when the conveying of steam, other gases, liquids or semi-solids involves such problems as misalignment, movement, vibration or installation in cramped spaces. When the problem is the protection of electrical wiring against moisture, acid fumes, chemicals, grease and dirt—as well as abrasion—American Sealtite Flexible Metal Conduit is the answer.

Call on American engineers for technical assistance in determining the ideal connector (including fittings) for your use. American Flexible Metal Hose is made from several types of spirally wound metal strip, with joints either packed or unpacked. American Seamless Flexible Metal Tubing is made from one-piece seamless tube, corrugated for maximum flexibility. We make a variety of alloys and hose patterns in I.D.'s ranging from ⅛" to 12". Literature on request.

ANACONDA

American

METAL HOSE

THE AMERICAN BRASS COMPANY

American Metal Hose Branch

General Offices: Waterbury 88, Connecticut

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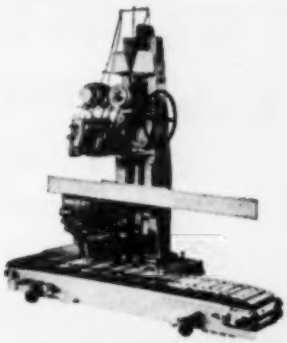
These Bagpakers® permit use of the shortest length open mouth multiwall bag possible. Savings often run to 3 or 4 inches per bag. The strong "cushion stitch" closures absorb strains of handling or dropping, and will hold your materials dependably. Closing speeds? Up to 15 heavy-duty multiwalls per minute. And note how rugged the equipment—it's designed for trouble-free operation, day after day...year after year. One machine sews closures at high speeds; the other, in addition, adds tape over the closures. Write for full details and a proposal.

MULTIWALL ECONOMIES

HIGH-SPEED PACKAGING

get both with Bagpakers!

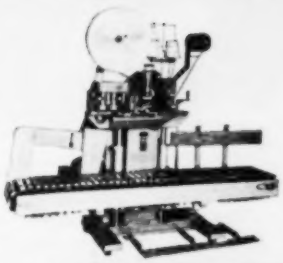
BAGPAK DIVISION



SEWS THE FAMOUS BAGPAK® "CUSHION STITCH"



MODEL "E-1" (portable) closes up to 15 bags per minute. A single foot pedal controls both conveyor and sewing head. Handles both paper and textile bags.



SEWS A TAPED CLOSURE—moisture-resistant, sift-proof, tough.

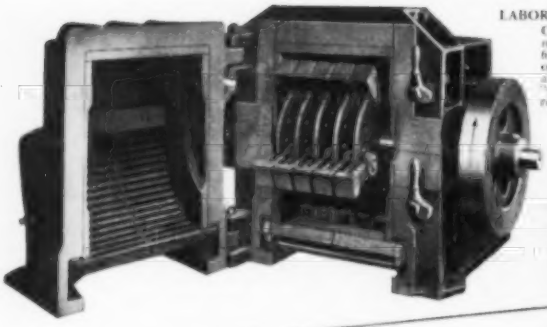


MODEL "DA" (portable) applies tape over "cushion stitch", making a tight seal. One operator, filling and closing, can handle 2 to 4 bags a minute ... 6 to 12 where filled bags are delivered to BAGPAKER conveyor.

International Paper Company, Bagpak Division - 220 East 42nd St., New York 17, N. Y.

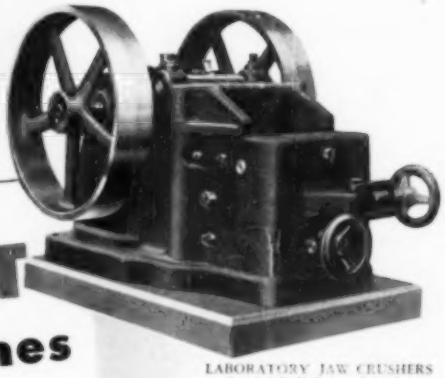
Branch Offices: *Atlanta, Baltimore, Boston, Chicago, Cleveland, Baxter Springs, Kansas, Los Angeles, New Orleans, Philadelphia, Pittsburgh, St. Louis, San Francisco*

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LABORATORY SWING-SLEDGE MILLS

Capable of reducing soft, moderately hard and tough or fibrous materials to any degree of fineness between 1 in. and 20 mesh. The patented "Open-Door" feature permits ready accessibility for cleaning.



STURTEVANT

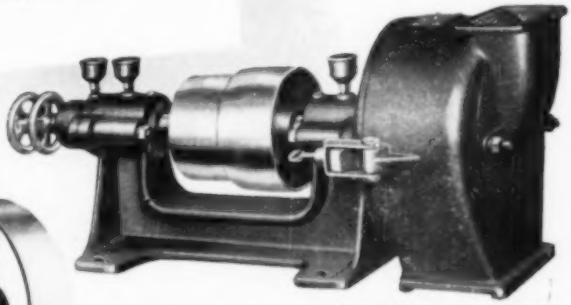
Laboratory Machines

Assure Quality of Products

Fast - Economical - Accurate

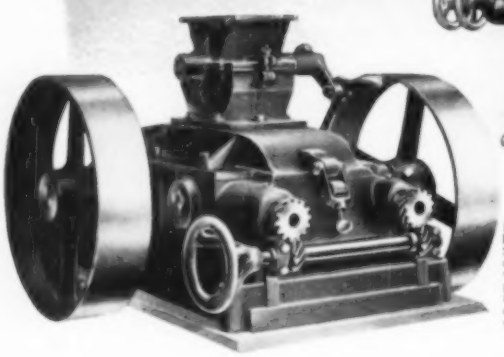
LABORATORY JAW CRUSHERS

Special Roll Jaw action simplifies close regulation of the product with capacities varying from 500 or 400 lbs. per hour at finest settings, to 1000 or 2000 lbs. when opened for coarser work. Each part of the crusher is accessible for quick and easy cleaning.



LABORATORY SAMPLE GRINDER

Laboratory Sample Grinders are of the "Open-Door" disc type and are capable of very fine work, producing products as fine as 100 mesh (coarser if desired) when working on dry, friable, soft or moderately hard materials. Simply turn hand wheel to provide product regulation from 10 to 100 mesh.



LABORATORY CRUSHING ROLLS

First designed especially for laboratory sampling work, Sturtevant Crushing Rolls are used regularly in many plants where there are limited outputs. Range of output for the 8 x 5 size is from ¼ in. to 20 mesh — and for the 12 x 12 size from ¾ in. to 20 mesh.

The only sure way to maintain strict quality of products is laboratory control . . . and that calls for accurate sampling.

Sturtevant Laboratory Equipment meets the exacting requirements of laboratory work. They are fast and accurate . . . provide true samples.

Rugged and dependable, Sturtevant equipment actually has all the features of full size machines plus extra accuracy and wider range of adjustment. The "Open-Door" accessibility permits quick, thorough cleaning . . . prevents the possibility of previous batches from contaminating new samples.

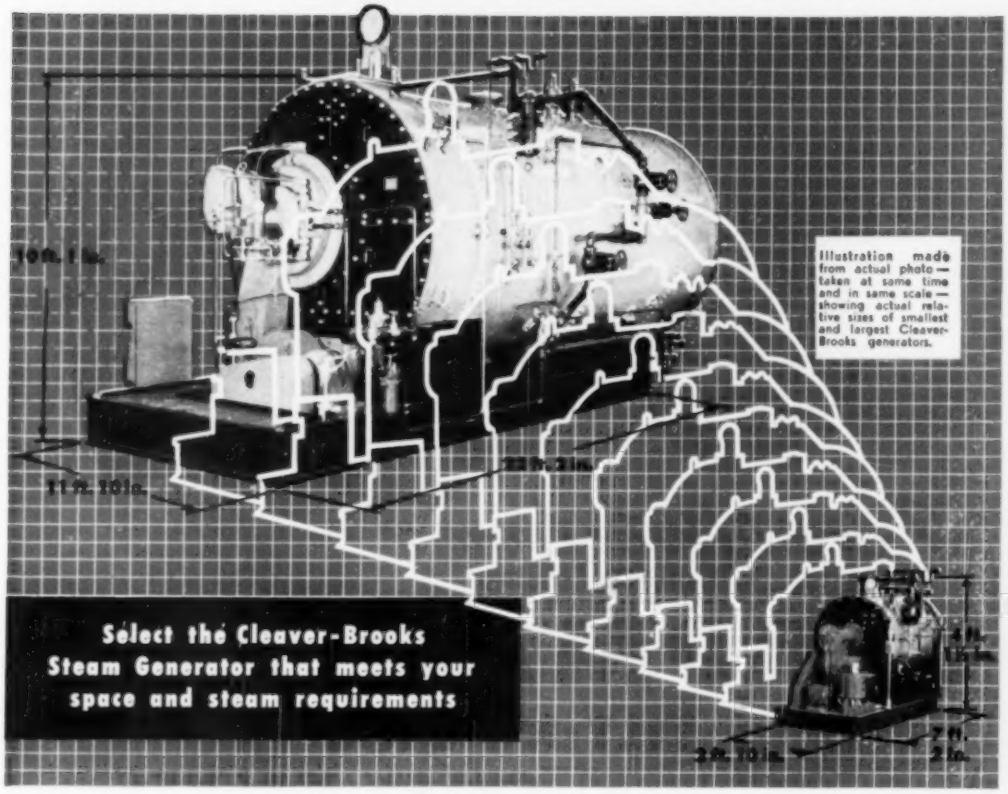
Investigate Sturtevant equipment for your laboratory. It will cut your sampling costs . . . help maintain strict quality of products . . . increase sales. Write for complete details and catalog.

STURTEVANT MILL COMPANY

100 CLAYTON STREET, BOSTON 22, MASS.

Designers and Manufacturers of: CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS • MECHANICAL DENS and EXCAVATORS • ELEVATORS • MIXERS

WHY SHOP FOR A BOILER??



WHY search and shop for a boiler — install a Cleaver-Brooks engineered and self-contained unit that fully meets your steam requirements and needs only a minimum of space and headroom.

You can select from a range of sizes 15 to 500 hp. — and you can have your Cleaver-Brooks boiler equipped for oil, gas, or with a combination burner which permits alternate use of gas or oil and provides for a quick change-over from one fuel to the other.

Equally important — you get Cleaver-Brooks guarantee of at least 80% efficiency from full load down to 30% of rating — with either gas or oil as fuel — and IN ALL SIZES.

Cleaver-Brooks steam boilers enable you to burn the available fuel in your area — give you clean, smokeless operation—eliminate fuel and ash handling — need no high or costly stacks — no special foundations — fit under low headroom and into limited space — provide flexible operation to meet fluctuating loads — fully meet all codes.

Oil or Gas Fired . . . Guaranteed 80% Efficiency from Full Load Down to 30% of Rating . . . IN ALL SIZES

Available in a size to fit your needs — 15 to 200 p.s.i., 15 to 500 hp.—write for Cleaver-Brooks Steam Boiler bulletin.



CLEAVER-BROOKS COMPANY, 339 E. Keefe Ave., Milwaukee 12, Wis.

WRITE on your business letterhead for Free Steam Cost Calculator — a ready reference slide rule showing the comparative steam costs when using oil, gas or coal as fuel.

Cleaver-Brooks

HAVE SERVED INDUSTRY FOR MORE THAN FIFTEEN YEARS



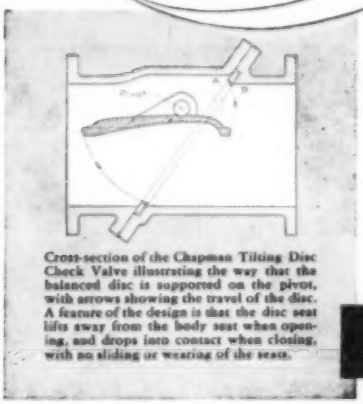
Prevent Water Hammer

with the "CUSHIONED CLOSING" of

CHAPMAN

TILTING DISC CHECK VALVES





Cross-section of the Chapman Tilting Disc Check Valve illustrating the way that the balanced disc is supported on the pivot, with arrows showing the travel of the disc. A feature of the design is that the disc seat lifts away from the body seat when opening, and drops into contact when closing, with no sliding or wearing of the seats.

Chapman Tilting Disc Check Valves *work with . . . not against . . . the stream.* As a result, destructive pipe line stresses are practically eliminated. Head losses, as compared with conventional type check valves, are reduced 65% to 80%.

This balanced disc rides smoothly on the flow. It lifts away easily when opening . . . closes quickly and quietly. There is no rubbing on the seat . . . no slamming. Hinge pins, seats and bearings wear far longer.

These are facts. Write today for engineering data and reports of tests. Valves available in either iron or steel.

The Chapman Valve Manufacturing Company
INDIAN ORCHARD, MASSACHUSETTS

For High Quality in Your End Products...Use
HOOKER HIGH QUALITY TOLUENE DERIVATIVES

When you want a high quality product from your reactions with toluene derivatives, you will find no better assurance than by using Hooker Benzoyl Chloride, Hooker Benzyl Chloride or one of the other Hooker products.

Years of experience in chlorination techniques plus high purity chlorine from the Hooker "S" Cell and carefully selected raw materials, make these Hooker intermediates the highest quality obtainable. Ten Hooker toluene derivatives provide you with a choice that will best meet your requirements from the standpoint of end product desired, ease of handling, yield and cost.

Listed below are the principal properties and uses of Hooker Benzoyl Chloride and Hooker Benzyl Chloride—most widely used of the Hooker toluene derivatives. Technical Data Sheets and samples are available to qualified personnel when requested on your letterhead. Bulletin 320, also supplied on request, gives more detailed information on the reactions of these Hooker products.

HOOKER RESEARCH PRESENTS
BIS(TRIFLUOROMETHYL)BENZENE



Para Isomer

Molecular Weight	214.11
Freezing Point	−40° to −50°C
Boiling Point	115°C
Specific Gravity, 20°/13.9°C	1.395
Refractive Index, n20/D	1.379

Hooker Bis(trifluoromethyl)benzene (xylene hexafluoride) is a clear, water white liquid. The product, a mixture of the meta and para isomers, is currently available in pilot plant quantities. A study of the literature indicates that it is of interest as a chemical intermediate in the preparation of dyestuffs and in the preparation of non-flammable dielectric and hydraulic fluids.

Technical Data Sheet No. 368 gives physical and chemical characteristics. Literature and samples are available to qualified personnel when requested on your business letterhead.

BENZOYL CHLORIDE

Formula	C_6H_5COCl
Molecular Weight	140.5
Freezing Point	0.9°C
Boiling Point	198°C
Refractive Index n20 D	1.5536
Flash Point	72°C
Fire Point	85°C
Specific Gravity, 15.5°/15.5°C	1.219

DESCRIPTION

Colorless liquid possessing a pungent characteristic odor; it fumes when exposed to moist air.

USES

Benzoyl Chloride is a highly active chemical which can be used to introduce the benzoyl group into organic compounds, especially through Friedel-Crafts reactions. Other uses are in the manufacture of benzophenone, benzyl benzoates, synthetic perfumes, dyes and pharmaceuticals.

BENZYL CHLORIDE

Synonym	Alphachlorotoluene
Formula	$C_6H_5CH_2Cl$
Molecular Weight	126.5
Freezing Point	−43°C
Distillation Range	5° or less including 179.4°C
Refractive Index, n25 D	1.5365
Specific Gravity, 15.5°/15.5°C	1.107

DESCRIPTION

Colorless to light yellow liquid having a pungent odor. The above data are for the high grade product. Also available as a technical grade with a wider distillation range.

USES

In manufacture of intermediates, dyestuffs, perfume bases, plasticizers, resins, wetting agents, rubber accelerators, gasoline gum inhibitors, pharmaceuticals.

OTHER HOOKER TOLUENE DERIVATIVES

BENZYL ALCOHOL, TECH. · BENZOIC ACID · BENZOIC ANHYDRIDE · BENZOTRICHLORIDE · BENZYL THIOCYANATE · METHYL BENZOATE MONOCHLOROTOLUENE · SODIUM BENZOATE

From the Salt of the Earth

HOOKER ELECTROCHEMICAL COMPANY

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HOOKER CHEMICALS

9-251

SODIUM SULFIDE • SODIUM SULFHYDRATE • SODIUM TETRASULFIDE • CAUSTIC SODA • MURIATIC ACID • PARADICHLOROBENZENE • CHLORINE



This Autoclave is Doubly Protected by

BS&B SAFETY HEADS

BS&B SAFETY HEADS are intentional "weak spots" in the pressure vessel. They are designed to burst at a pressure safely below the bursting point of the vessel itself. Simple pre-formed metal rupture discs held in specially designed flanges, they have no moving parts to fail. They require no setting or maintenance. They cannot be "screwed down" to prevent their functioning as safeguards for your personnel and property.

Wait no longer for this sure-thing protection against *Over*-pressure. Use COUPON BELOW. Fill out and send today to Special Products Division, Black, Sivalls & Bryson, Inc., Power and Light Bldg., Kansas City 6, Mo.





BS&B SAFETY HEADS

Special Products Div., Dept. SH-S, BLACK, SIVALLS & BRYSON, INC.
Power and Light Building, Kansas City 6, Missouri

I'd like full details of the BS&B Safety Heads.

☐ Please forward complete data. ☐ Arrange to have Sales Engineer call on me.

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FIRM _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

ORONITE CHEMICAL COMPANY

THE NAME TO WATCH IN CHEMICALS

USE ORONITE POLYBUTENES FOR TACKINESS..HIGH DIELECTRIC STRENGTH..MOISTURE RESISTANCE

Adhesives, electrical insulation, sealing compounds, insecticides, leather and many other products can be greatly improved with Oronite Polybutenes.

Because of its inherent tackiness, this extremely useful product offers adhesive formulators, close control of "quick grab," "legs," and removal characteristics. High dielectric strength, low power factor, stability, moisture resistance and flexibility are a few additional advantages of Oronite Polybutenes.

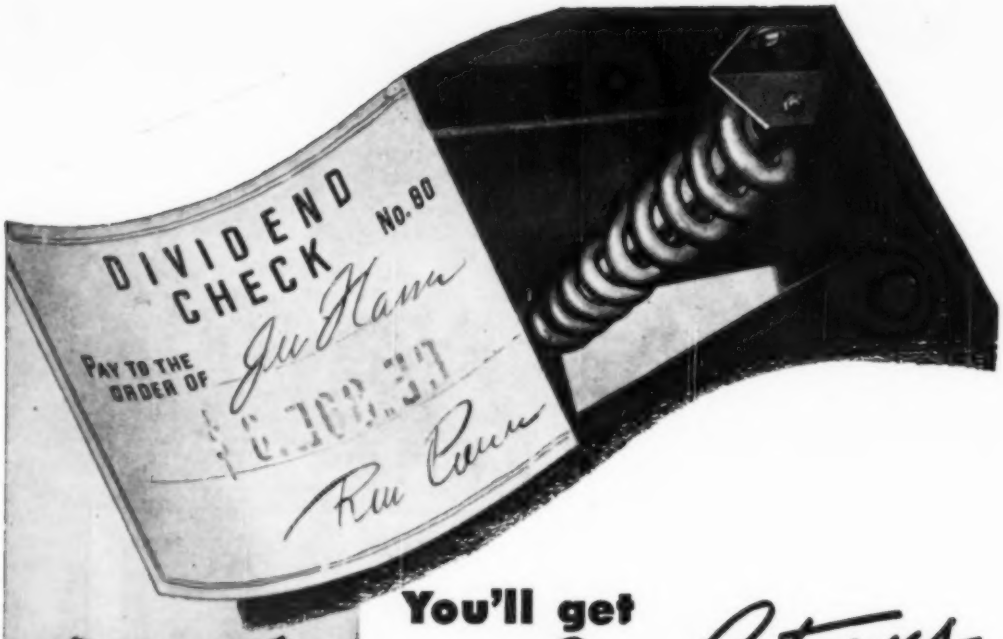
Here also, is an excellent bodying agent. Eight grades of viscosity are available to meet specialized conditions. They can be compounded with a wide range of resins, oils, waxes, elastomers and adhesives. Investigate this important product today. Call or write the Oronite office nearest you.



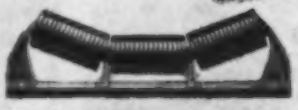
In formulating adhesives, Oronite Polybutenes offer a wide range of variation in control of initial tack, strength, softness, removal characteristics and hot melt viscosity. They are adaptable in all types of mechanical application of adhesive composition onto backings whether it be by hot melt, solvent or emulsion. This versatile chemical product offers new possibilities in formulations requiring tackiness, pliability, moisture resistance, bodying or high dielectric strength.

ORONITE CHEMICAL COMPANY

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STANDARD OIL BLDG., LOS ANGELES 15, CALIFORNIA
30 ROCKEFELLER PLAZA, NEW YORK 20, NEW YORK
600 S. MICHIGAN AVENUE, CHICAGO 5, ILLINOIS



You'll get *Big Returns* from this return idler!



Rex Style No. 35 Impact Cushioning Idler . . . dual purpose rubber rolls cushion shocks at loading points . . . minimize belt rupture and lacerations.



Rex No. 33 Self-Aligning Troughing Idler . . . used at intervals to align belt where off-center loading, side-wind drifting and uneven stretch are problems.



Rex No. 33 Troughing Idler . . . is roller-bearing equipped, can be furnished with steel or gray iron rolls. Has no shelves or pockets to catch dust . . . is self-cleaning.



Rex No. T-6 Flat Belt and No. T-1 Return Idlers . . . are dead shaft type idlers. They are equipped for high pressure grease lubrication . . . have hydraulic type fittings.

AN INVESTMENT in Rex Rubber-Covered Spiral Return Idlers will return big dividends in longer idler life, fewer conveyor breakdowns with less lost production time.

Why?

Because this patented return idler provides an ever-changing point of contact between the belt and idler. Ice, abrasive, corrosive and sticky material cannot build up on the idler and cause premature wear and operating difficulties. And the rubber-to-rubber contact between idler and belt reduces wear on the idler to the minimum.

Rex Rubber-Covered Spiral Return Idlers are made of flat-bar steel helical spirals covered with rubber. The spiral is mounted on a standard Rex Unit Roller Bearing Assembly Tube . . . the famous tube design that leads the idler field in long-life service. Spiral has left and right-hand sections to insure centering of the belt.

Install a few of these cost-cutting return idlers immediately following the head pulley of your conveyors and watch the returns you get in smooth, trouble-free service. A Rex Idler Specialist will be glad to give you the complete story. Or if you prefer, send for Bulletin No. 48-41. Address Chain Belt Company, 1648 West Bruce Street, Milwaukee 4, Wis.

CHAIN BELT REX COMPANY BELT CONVEYOR IDLERS

3 answers to your solvent problems



SERVICE IN 48 STATES

Export inquiries invited

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When you have a solvent problem, ask yourself:

1 *Who has the experience and know-how to give quick, expert assistance?*

Amsco—over 25 years of it. For more than a quarter century Amsco has been tackling knotty solvent problems and coming up with the right answers.

2 *Who has the most complete line of petroleum-base solvents available?*

Amsco. Every one, from oldest to newest, must measure up to Amsco's reputation for uniform high quality that costs no more.

Though Amsco stands ready to tailor a new solvent specifically to your needs, chances are one already developed will fill the bill perfectly. For Amsco solvents offer—

—choice of volatility
—choice of solvency
—any desired boiling range
—high degree of purity with good odor.

3 *Who can deliver what I want, when and where I want it?*

Amsco. No matter where you are, careful attention will be given every detail of your instructions. Amsco gives dependable service *in all 48 states* from strategically located refineries and bulk plants.

We'd like to tell you more about Amsco products and famous Amsco "Service that goes beyond the sale." If you'd like to know what they can do for you . . . mail the coupon today.

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230 North Michigan Avenue
Chicago 1, Illinois

Please send information on the complete line of Amsco petroleum-base solvents to:

Name.....

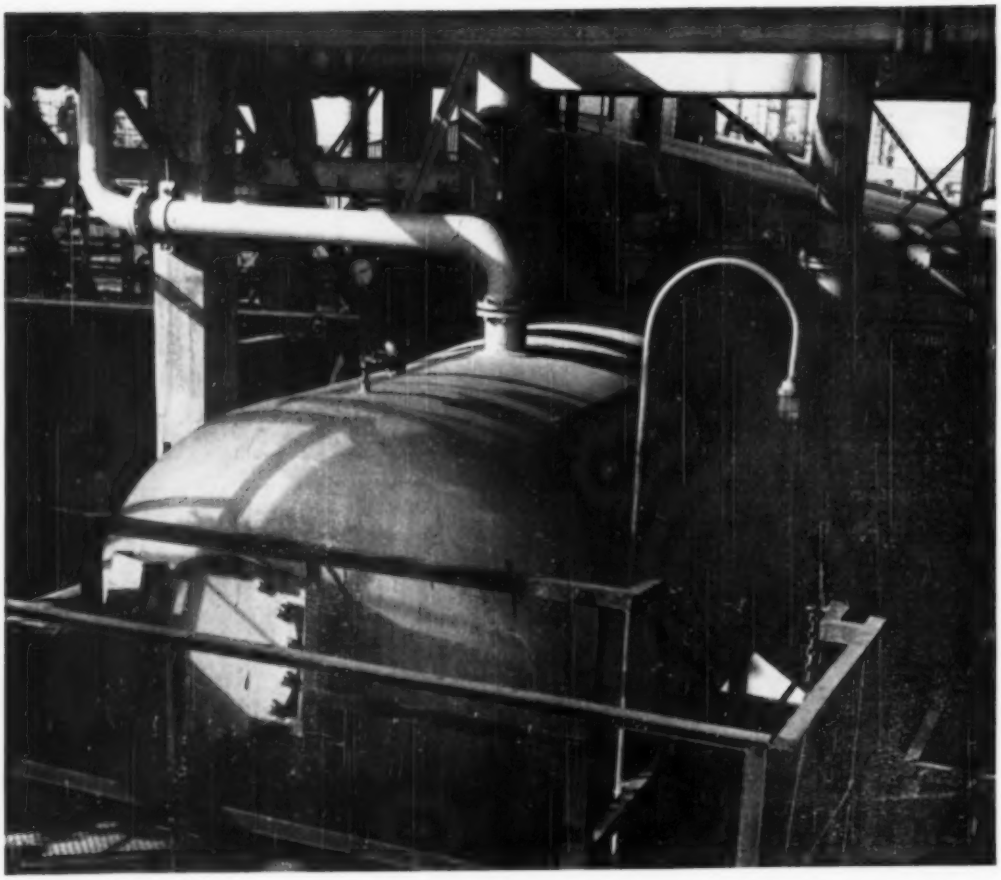
Position.....

Company.....

Street Address.....

City.....State.....

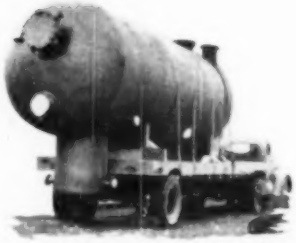
(Samples sent on request)



Monel-clad pressure vessel: *refinery style*

Right at the heart of one of the world's largest oil refineries is this welded-steel cylinder—a reflux accumulator at the foot of an atmospheric pipe still. Design specifications called for a tank 7 ft. 6 in. in diam. by 20 ft., to operate at a pressure of 50 lbs. per sq. in. and a temperature of 650° F. Also required was a stainless-clad interior for corrosion resistance. We built the tank in our Birmingham shops and shipped it to its Louisiana destination by truck.

This is just the simple and factual history of a single "custom-built" piece of steel plate work, but it is part of the big story of CB&I-built tanks and pressure vessels being supplied every day to petroleum refineries and other chemical processing industries. When you need similar equipment, ask our nearest office for quotations.

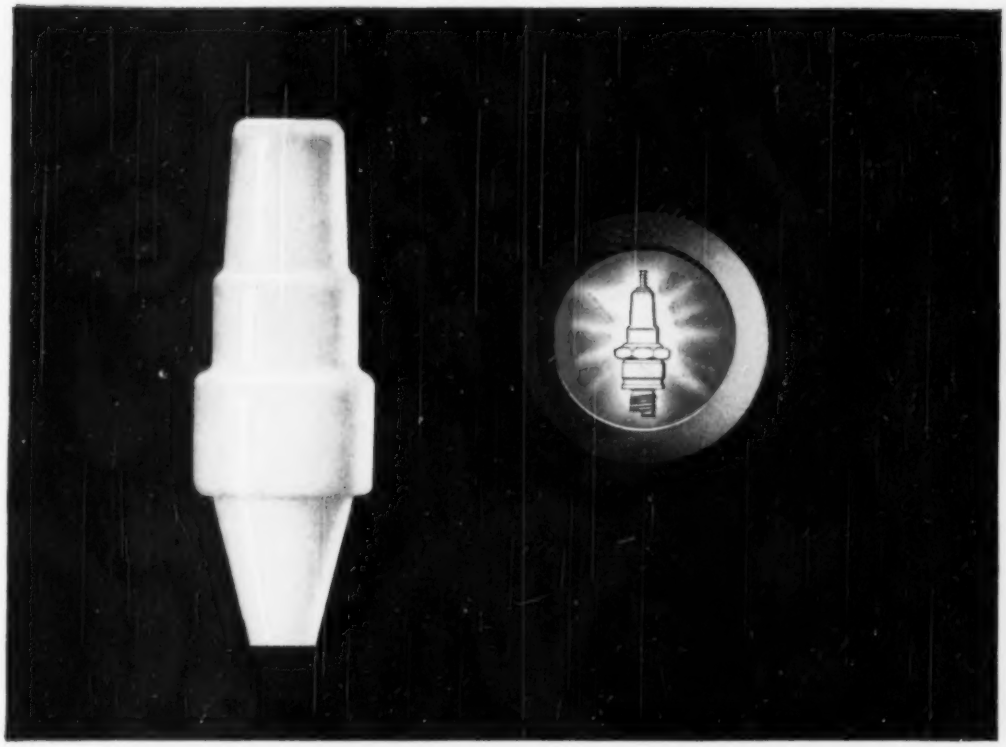


The shop-built reflux accumulator leaving our Birmingham plant by truck. It is shown above installed at the refinery.

CHICAGO BRIDGE & IRON COMPANY

Atlanta 3	2120 Healey Bldg.	Detroit 26	1503 Lafayette Bldg.	Philadelphia 3	1625—1700 Walnut St. Bldg.
Birmingham 1	1510 North Fiftieth St.	Havana	40 Abreu Bldg.	Salt Lake City 1	1505 First Security Bank Bldg.
Boston 10	1005-201 Devonshire St.	Houston 2	2103 National Standard Bldg.	San Francisco 11	1222—22 Battery St. Bldg.
Chicago 4	2124 McCormick Bldg.	Los Angeles 14	1505 General Petroleum Bldg.	Seattle 11	1305 Stuart Bldg.
Cleveland 15	2220 Guildhall Bldg.	New York 6	3318—165 Broadway Bldg.	Tulsa 3	1623 Hunt Bldg.

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PENNSYLVANIA



Maybe this spark plug porcelain can help YOUR business

The spark plugs in your car take a *terrific* beating—and *stand up under it!* Excessive pressures, from extreme cold to intense heat, sudden mechanical shocks, high electrical stresses and the erosive forces of explosion pound away relentlessly.

But how rarely do your spark plugs give you trouble? One reason why you are able to virtually forget them is because all leading spark plug manufacturers make the porcelain bodies out of ALCOA ALUMINA—an inert ceramic material. It withstands temperatures as high as 3400° F. . . . compressive stresses up to 410,000 lb. per sq. inch . . . tensile stresses up to 36,000 lb. per sq. inch. It has dielectric strengths up to 1100 volts per mil of thickness.*

* From "Westinghouse Engineer," May 1946

ALCOA ALUMINA is a material of uniform high quality for high quality products such as: Electrical insulators . . . grinding balls . . . high-temperature refractories . . . burner tips . . . heat-transfer pebbles . . . combustion and thermo-couple tubes . . . and linings for furnaces, kilns and towers.

Perhaps here is just the material you've been looking for. Let us tell you more about this interesting, versatile aluminum oxide. Maybe ALCOA ALUMINA can help *your* business.

It is readily available in any quantity. Write to ALUMINUM COMPANY OF AMERICA, CHEMICALS DIVISION, 1778 Gulf Building, Pittsburgh 19, Pennsylvania.

ALCOA

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ALUMINAS AND FLUORIDES

ACTIVATED ALUMINAS • CALCINED ALUMINAS • LOW SODA ALUMINAS • TABULAR ALUMINAS • HYDRATED ALUMINA
ALUMINUM FLUORIDE • SODIUM FLUORIDE • SODIUM ACID FLUORIDE • FLUOBORIC ACID • CRYOLITE



XRD-3B—*the basic unit*
XRD-3F—*for film technics*
XRD-3S—*the x-ray spectrometer*
XRD-3D—*for direct measurement*

Analyze directly with the XRD-3!

Go beyond the microscope. Dig down into the fundamental structure of matter. Find the atomic positions, ionic groupings and crystallographic systems of substances. And do it economically—with the XRD-3.

Whether you are working with metals or metal alloys . . . ores, clays and other mineral structures . . . paints and pigments . . . ceramics and glass . . . cement and plaster . . . textiles and fibers . . . or rubber and allied products . . . you'll get more information—faster—with the XRD-3. Here's why!

You are sure. You get G-E accuracy in the XRD-3. Latched ma and high-voltage positions reproduce settings accurately for long series of experiments. Exposure timer is correct to within 60 seconds in a twenty-hour range. X-ray intensity is constant; plus or minus ½ per cent. Resolution of diffraction data is optimum—for powder data, 0.02 degree maximum.

You are completely equipped. There are available for use with the basic XRD-3 components which make possible (1) the direct measurement of diffracted intensities, (2) the direct measurement of fluorescent x-ray spectra, (3) all film technics. All XRD cameras and many others fit the standard diffraction instrument support. The clear flat top around and under the tube makes the adaption of other cameras simple.

You are seated. You work at a desk-type console. All meters and controls are within easy reach. You read spectrogoniometer angles from stationary indicators without your leaving your chair. Controls, transformer *and* water cooler are *within* the console.

FREE—The story of the most modern of diffraction devices—the XRD-3. Write General Electric X-Ray Corporation, Dept. D-5, 4855 W. McGeoch Ave., Milwaukee 14, Wisc.

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X-RAY CORPORATION

General Electric X-Ray Corporation manufactures and distributes x-ray apparatus for industrial, dental and medical use; electromedical apparatus; x-ray and electromedical supplies and accessories.

ASK STOKES

We fill the Yawning Gap between "Glass" and Manufacture



MANY a plant has an excellent laboratory to carry the new product through the "glass" stage to a fully successful conclusion.

Many plants have excellent manufacturing equipment for current products but find themselves perplexed when the new product comes from the laboratory . . . full of promise and problems.

For any problem in the chemical processing, food processing, or pharmaceutical field, there are two sure ways to take the next big step:

1. Bring it to Stokes and let us take it through our semi-plant-scale laboratory under the guidance of Stokes' experienced engineers.

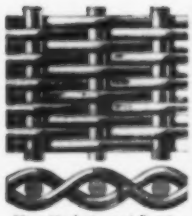
2. Buy your own semi-plant-scale equipment from Stokes and conduct your own tests. We have specialized for years in the design and manufacture of pilot plant equipment.

Either way you arrive at a conclusive answer to what the production equipment will do. If you have a yawning gap between an idea and a marketable product, we invite discussion.

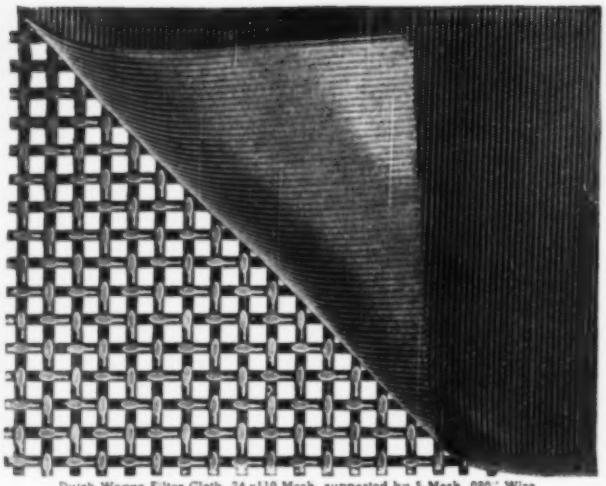
F. J. Stokes Machine Company, 5920 Tabor Road, Philadelphia 20, Penna.

Stokes makes Vacuum and Special Processing equipment, High Vacuum Pumps and Gages, Pharmaceutical equipment, Industrial Tabletting and Powder Metal Presses, Plastics Molding Presses, Water Stills and Special Machinery.

STOKES KNOWS HOW

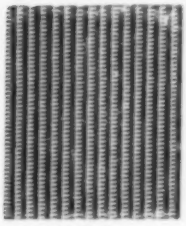


Magnified view of Dutch Weave





Double-Crimp



12 x 64 Mesh
Dutch Weave Filter Cloth

Dutch Weave Filter Cloth, 24 x110 Mesh, supported by 5 Mesh .080" Wire, Calendered Backing Screen



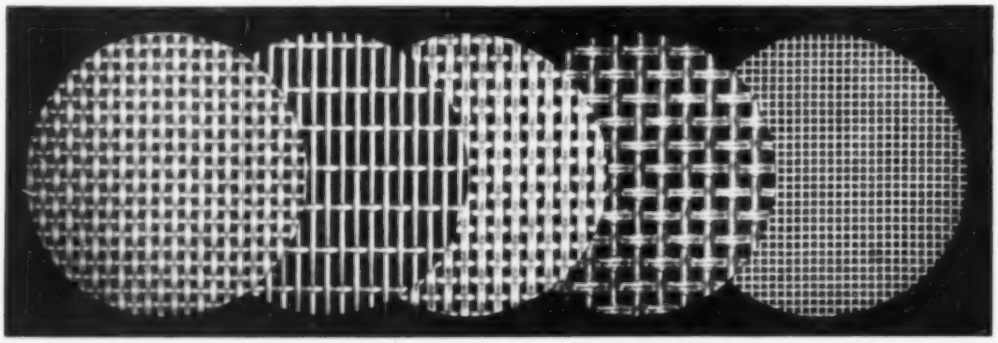
Stranded Wires
Twilled Weave

INDUSTRIAL SCREENS, WIRE CLOTH and WIRE FILTER FABRICS

of stainless steels, chrome steel, chrome nickel, pure nickel, nickel-copper (monel), pure copper, tinned copper, commercial bronze, manganese bronze, phosphor bronze, brass, aluminum, galvanized steel, tinned steel - - - any metal, alloy or finish available to solve industrial problems of corrosion, contamination, discoloration, temperature changes - - -

SUPER-LOY steels to withstand abrasion - - endure vibration - - resist fatigue - -

ENGINEERED TO YOUR EXACT REQUIREMENTS - - standard or special widths, continuous lengths, slit ribbons, sheared sheets, tru-circle cylinders, discs or rings, or special template shapes.



The LUDLOW-SAYLOR WIRE CO.
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Send Catalog No. 90 on INDUSTRIAL SCREENS, WIRE CLOTH and WIRE FILTER FABRICS.

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CITY-ZONE-STATE .....

LUDLOW SAYLOR

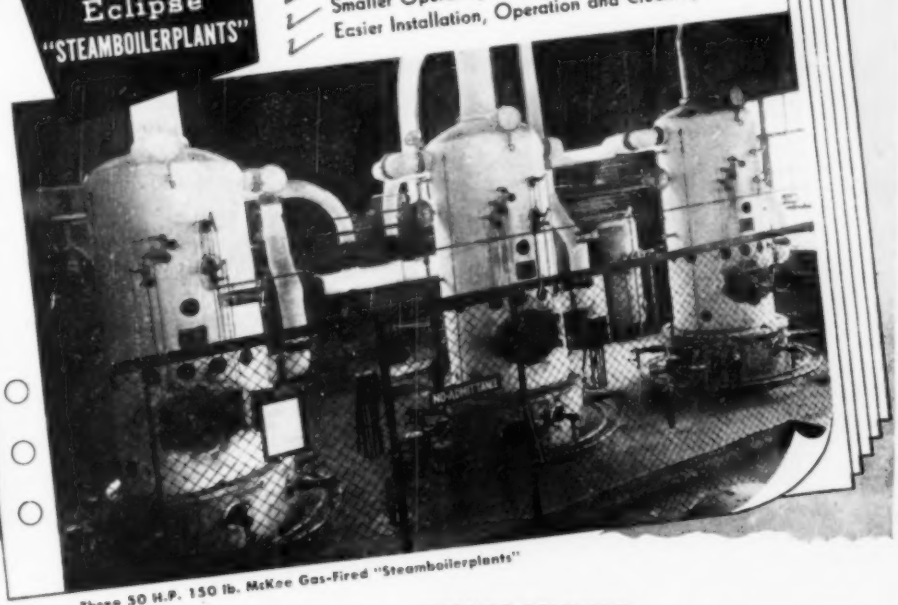
A Plant Superintendent's Dream — "SUMMER STEAM"*

*Small steam boilers to carry the summer load.

Get ready for summer months, that will be here soon. Follow the example of this large glass plant (installation shown) and other manufacturers who put in one of more McKee Eclipse STEAMBOILERPLANTS for the off-peak period and get these advantages:

- Elimination of wasteful operation of large boiler plants at low load.
- No plant overheating
- Smaller Fuel Bills
- Smaller Operating Expense
- Easier Installation, Operation and Cleaning

McKee Eclipse "STEAMBOILERPLANTS"



Three 50 H.P. 150 lb. McKee Gas-Fired "Steamboilerplants"

PROMPT DELIVERY

By ordering now, you can have delivery of McKee "STEAMBOILERPLANTS" in time for summer installations. These boilers are small, high pressure steam (up to 300 p.s.i.); perfect for heating autoclaves, presses, dryers, evaporators, stills, etc.

McKee Eclipse "STEAMBOILERPLANTS" are Gas-Designed, Gas-Fired — with the small, vertical tubes that mean low heat loss.

A COMPLETE PACKAGE, "STEAMBOILERPLANT" requires no extras; is ready to install and connect and we take complete responsibility for satisfactory performance of the entire unit.

½ to 75 H.P. carried in stock — Larger sizes to special order.

Write for Bulletin A-106

Representatives in the following cities:

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Eclipse Fuel Engineering Company
ROCKFORD ILLINOIS

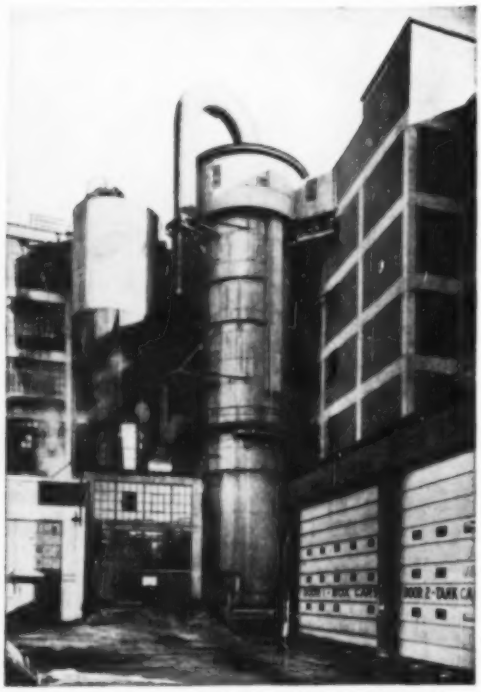
McKee Eclipse

Quality Control in Producing

includes INCONEL-CLAD STEEL PROTECTION



For all maintenance cleaning. Write Colgate for free working sample—enough to make 40 gallons of cleaning solution. (In Canada: Toronto. In U. S.: Jersey City, N. J.)



Most imposing equipment at the Toronto, Ontario, plant of Colgate-Palmolive-Peet Co., Ltd., is this 150-foot Inconel-Clad Steel spray tower in which VEL is solidified.

Inconel is inert in the presence of materials employed in the production of VEL, the soapless cleanser. Inconel surfaces protect the purity of the product, and the equipment is not harmed by corrosion. That's why Colgate-Palmolive-Peet Company, Ltd., uses Inconel-Clad Steel processing equipment in their Toronto, Ontario, plant.

In this Lukens Clad Steel, the Inconel cladding (usually 10% or 20% of total plate thickness) is inseparably bonded to steel backing plate. Thus, the equipment provides protection equivalent to this *solid* corrosion-resistant metal and yet its use shows *clad* steel economies.

If your processes need the protection offered by nickel, stainless steel, Inconel or Monel, you can gain similar economies through the use of Lukens Nickel-Clad, Stainless-Clad, Inconel-Clad and Monel-Clad Steels. Lukens produces plates up to 178 inches wide, or to over 3 inches thick. The extra smooth, sodium hydride finish makes equipment extra easy to clean.

For further data, write for Bulletins 255 and 338. Lukens Steel Company, 400 Lukens Building, Coatesville, Pennsylvania.



LUKENS

Nickel-Clad Stainless-Clad
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STEELS

SOLID METAL ADVANTAGES WITH CLAD STEEL ECONOMY

. . SPEED SCRAP TO THE MILLS TO MAKE MORE STEEL . .

at every step . . .

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Engineering

IN ACTION . . .



Bechtel designed and Bechtel built—
The outstanding performance of recently completed and operating plants in the fields of petroleum—the chemicals—and process industries—demonstrate that well-designed facilities develop from careful interpretation of clients' needs.

Bechtel engineering provides the process plus an economical and fully integrated operation—which, when combined with rapid achievement in procurement and construction, results inevitably in low costs.

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ANOTHER

Traylor

ROTARY COOLER

to ease a HOT Production Schedule



Traylor Rotary Coolers, Kilns and Dryers are characterized by the exact combination of rigid shell, floating-type riding rings and cut steel driving gear. Improved supports of the best type for each installation are adjustable for easy alignment maintenance. Write today for full information.

Traylor Rotary Coolers reduce cooling time . . . make "too-hot-to-handle" materials fit into close production Schedules. For more than 25 years, Traylor has built Rotary Coolers to fit individual installations. The demands of modern, high temperature thermo-processing are met by four main types which afford precise processing control. Special coolers, using air, water or a combination of both, are built to meet unusual requirements.

Traylor's skill in designing and building rotary equipment is evidenced by the miles of Traylor Rotary Kilns, Coolers and Dryers now in use by successful operators the world over.

We invite your inquiry, either with or without specific details of your processing problem.

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A "Traylor" Leads to Greater Profits

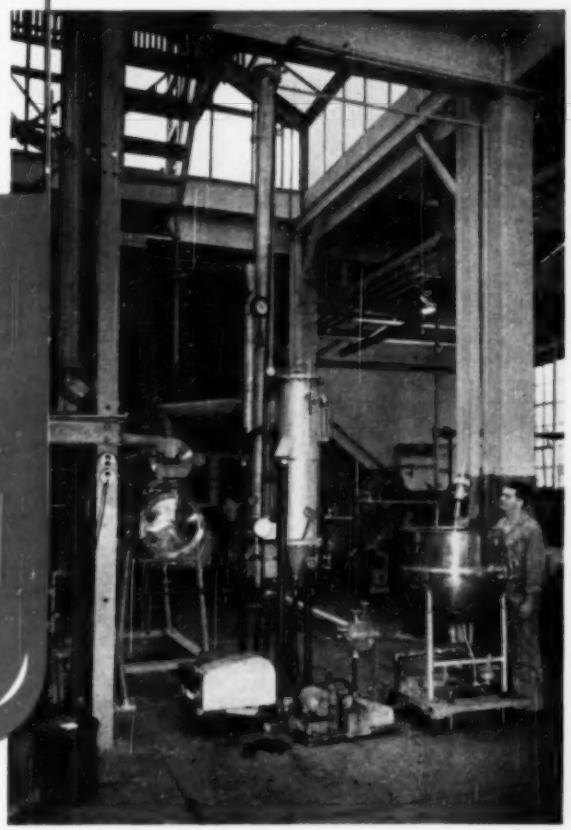
TELL-TALE EVIDENCE ...IT'S ALL THERE IN YOUR CONTEMPLATED PROCESS...

BUT...IT TAKES

BUFLOVAK PRE-TESTING

TO MAKE SURE THE EVIDENCE IS RIGHT!





BUFLOVAK EQUIPMENT

Division of Blaw-Knox Co

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BUFFALO 11, N. Y.

Yes, *even at the start,* when you are working on your contemplated process, there is ample evidence if the process is right or wrong—and the easy, sure thing to do is to submit it to rigid pre-testing at BUFLOVAK to learn what the process can actually do; its production cost, capacity, and characteristics of the finished product!

BUFLOVAK's widely-known Research and Testing Laboratories are available to you, so why not take advantage of them, as so many Chemical and Food Plants have? Over 6,000 tests have been successfully solved by BUFLOVAK. The tests, you know, lead to showing you the best, most economical way to process. They show you also, how to get the process *the way you want it* with the type of BUFLOVAK Equipment designed to your specific need!

BUFLOVAK works in strictest confidence, and you are assured complete secrecy.

You will profit by letting BUFLOVAK pre-test your contemplated process and suggesting whether you need Evaporators, Dryers, Solvent Recovery and Distillation Equipment, Castings, Chemical and Food Processing Equipment, or Vulcanizers.

Write us today for full details.



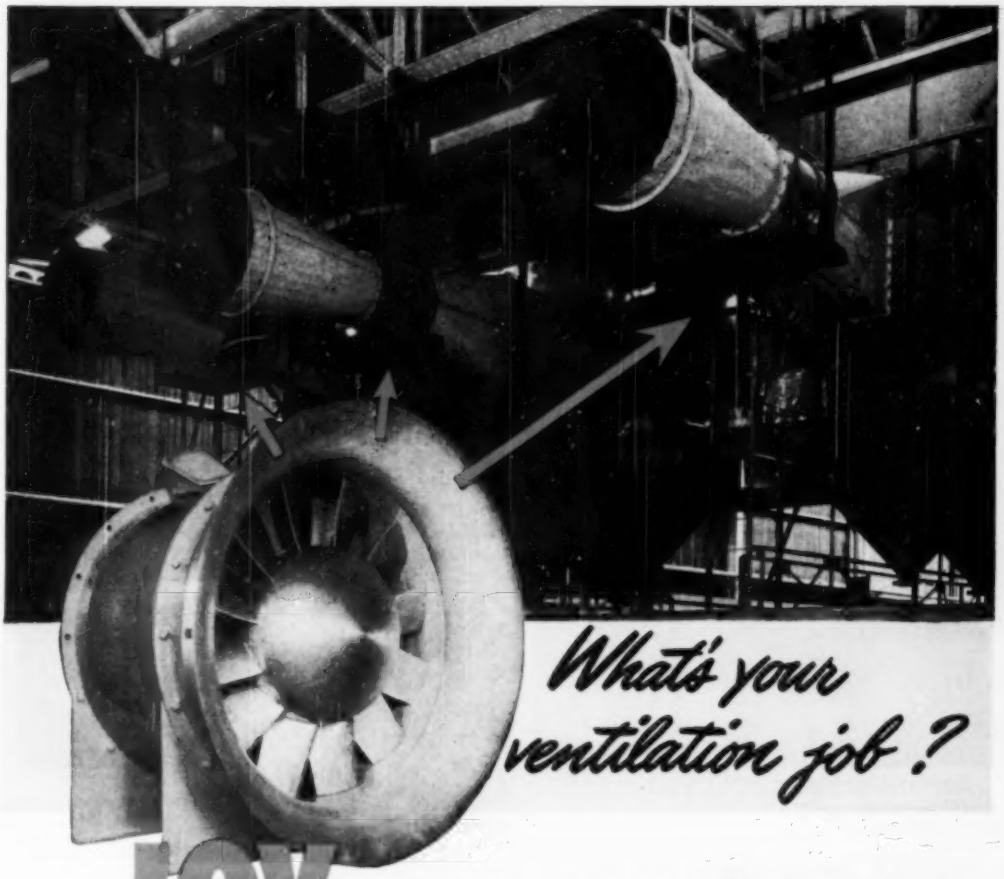
FAR OUTLASTS ITS DEPRECIATION PERIOD

Any water cooling tower "should" do all right for a few years, but after 5 or 10 years' service, users really appreciate the heavier, high quality materials and "tailor-made" construction of C. H. Wheeler. They still look and work "good-as-new" and continue to remain so for years and years, even where the installation location presents great weather extremes in summer and winter. Further, they are guaranteed to withstand hurricane winds up to 100 miles per hour. A good typical example of "5 year appreciation," and a repeat order, is shown in the photograph below, the latest installation, of course, being the new C. H. Wheeler "Funnel Top" Tower, which streamlines the flow of air from the water cooling zone to the Induced Draft Fans at the top of the tower. In 1955 or '60, you'll be glad, if you specify C. H. Wheeler Cooling Towers today. Write for Cata'og No. 145.

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1808 Sedgley Avenue, Philadelphia 32, Pennsylvania
REPRESENTATIVES IN MOST PRINCIPAL CITIES

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STEAM CONDENSERS • WATER COOLING TOWERS
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OF PHILADELPHIA



What's your ventilation job?

JOY AXIVANE* FANS

WILL DO IT MORE EFFICIENTLY AND MORE ECONOMICALLY!

Write for Bulletin, or *Consult a Joy Engineer*



From every possible angle, JOY Series 1000 AXIVANE Fans will give you a better, lower-cost job. Their inline, vane-axial design is lighter and more compact; and they operate more quietly, require less power and space, and save greatly on installation time and costs. What's more, you get the extra flexibility of adjustable blades—an *exclusive* JOY feature—permitting easy and quick on-the-job regulation of pressure or volume over a wide operating range, with positive protection against motor over-load. ● Whatever your job is, JOY AXIVANE Fans can show you advantages—let us work with you.

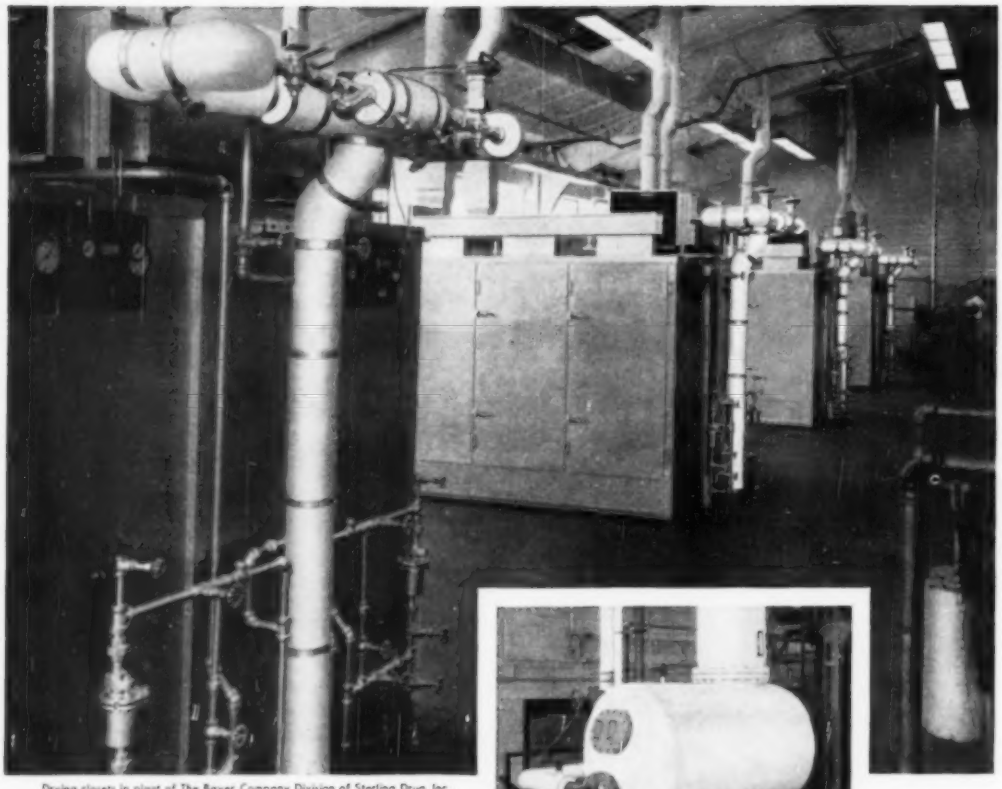
*Reg. U.S. Pat. Off.

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JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO



Drying closets in plant of The Bayer Company Division of Sterling Drug, Inc., Trenton, N. J. The 60-lb. steam pipes are covered with K&M "Featherweight" 85% Magnesia Insulation, 2 inches thick, canvas pasted and banded.

Reclaim Solvent Still in the Trenton plant. Tank and tower are insulated with 2-inch 85% Magnesia Block, finished with asbestos cement; steam line with 2-inch thick 85% Magnesia; return line with Standard Thick 85% Magnesia.

Where temperature control is important—

Nature made Asbestos... Keasbey & Mattison has made it serve mankind since 1873

K&M best in asbestos

K&M "Featherweight" 85% Magnesia Pipe Insulation

In the Trenton, N. J. plant of The Bayer Company Division of Sterling Drug, Inc. temperature control is vastly important. Insulation of *known* dependability is essential.

K&M "Featherweight" 85% Magnesia Pipe Insulation was used because in a wide variety of applications it has proved efficient and durable. It combines the high insulating properties of basic Carbonate of Magnesia with the proper amount of clean Asbestos Fibre as a binding element. It is extremely light in weight, easy to apply, fire-proof, mechanically strong. And is supplied in a wide range of sizes and weights.

K&M Distributors, located strategically throughout the country, are experts on the application of K&M insulating materials. Let them help you make important savings in your plant. Write us for further information.

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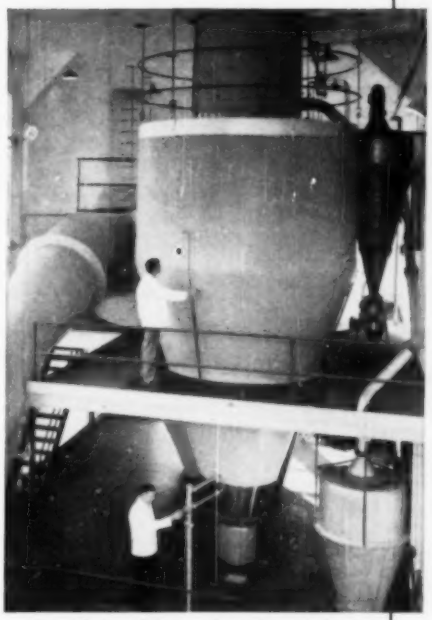
To Determine the Most Economical and Efficient Use of

spray drying

Swenson Has Set Up This Plant Scale Research Laboratory

HERE individual analyses and engineering studies are made to evaluate new applications of spray drying. Use of these facilities is made available to the process industries at a reasonable cost. As a result of this research program, spray drying is proving to be a logical development in processing a wide variety of chemicals.

If you believe that spray drying is the tool you have been looking for to simplify your processes or reduce costs, we urge you to make use of Swenson's research facilities. A letter today will start the ball rolling.



General view of Swenson Spray Dryer Laboratory showing drying chamber and wet collector

These are a few of the chemicals successfully dried with Swenson Spray Equipment

Alfalfa extract
Aluminum sulfate
Ammonium chloride
Animal blood
Azo dye pigments
Basic chrome sulfate
Bone glue
Calcium acetate
Caramel coloring
Cascara extract
DDT dusting powders
Detergents
Distillers' solubles
Lignin
Lime & Sulfur
Manganese sulfate
Molasses fermentation residuum
Organic dyestuffs
Pectin
Penicillin waste liquor
Pentaerythritol
Photographic chemicals
Polymethacrylic acid
Polyvinyl chloride polymers
Potassium acetate
Proteinaceous extracts
Sodium phosphates, mono-, di-, tri-
Sodium sulfate
Soya bean extract
Specialty starches
Starch conversion products
Sulfite liquor
Tannin extract
Toxaphene dusting powder
Yeast culture
Zinc sulfate monohydrate



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Again and again during the last quarter century we have been called upon to engineer, build, and equip facilities for the production of the two basic chemicals of U. S. Industry—chlorine and caustic soda. More than ⅓ of America's capacity is Ferguson-built. We are also at work on similar projects for Dominion Alkali and Chemical Co., Ltd. of Canada, and for the Colombian government at Bogota.

Much of our work for thirty years has been in the rapidly expanding chemical and processing fields, although we have also served over a score of *different* industries. And an amazingly high percentage of our business has been *repeat* business from leading industrialists who like our method of delivering a complete job under one contract, one responsibility, and one profit. Many of them have found it profitable to retain us on a *continuing* basis to handle *all* of their engineering and building problems as they arise. That method may have advantages for you. Why not call our nearest office?

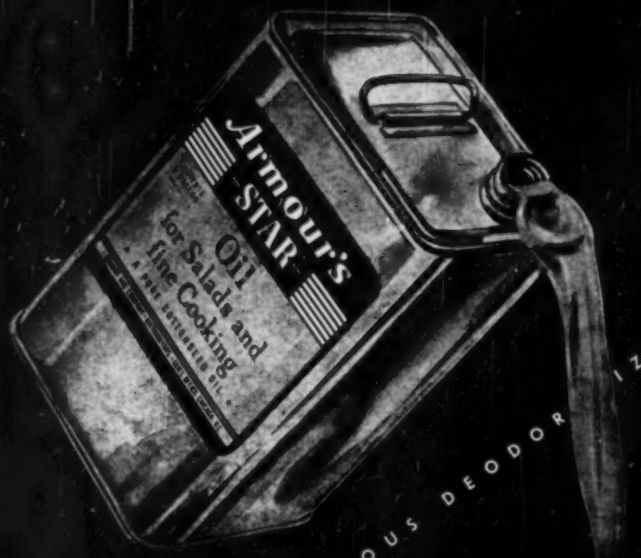
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UNDER ONE CONTRACT AND ONE RESPONSIBILITY, WE DESIGN, BUILD, AND EQUIP OUTSTANDING ANTIBIOTIC LABORATORIES • RESEARCH LABORATORIES FOOD PROCESSING PLANTS • RAYON PLANTS • PAPER MILLS • ATOMIC ENERGY PLANTS • CHEMICAL PROCESS PLANTS OF ALL KINDS • INDUSTRIAL PLANTS POWER PLANTS • WE ALSO FURNISH ENGINEERING REPORTS AND SURVEYS

quality and quantity

are the major considerations in marketing an Armour product.

By means of equipment designed and constructed by the Foster Wheeler Corporation, Armour and Company converts crude animal and vegetable oils into edible oils to be used for shortening, margarine, salad and cooking oils. To maintain product quality commensurate with the prestige of the Armour trademark, and production at the proper level to meet existing demands, Foster Wheeler is called on again and again to plan and construct additional plant facilities. Foster Wheeler's outstanding achievements in the field of industrial processing are partly attributable to the skill of FW engineers in applying basic chemical engineering unit operations to a given process.



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Refiners, petro-chemical processors, chemical manufacturers and a wide range of others in the petroleum and process industries are finding the service of the Graver Construction Co. a valuable asset in these days of expansion and modernization.

It is a complete service that integrates *all* phases of your construction job . . . from engineering and planning, through material procurement to on-the-site erection. Graver men and equipment are available at strategic locations . . . ready to start your job.

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No. 211 No. 800

Above left — Armstrong bottom inlet—top outlet series trap.

Above right — Armstrong No. 800 side inlet—side outlet trap.

PROOF THAT ARMSTRONG TRAPS PAY DIVIDENDS:

$20,119.62 FUEL SAVINGS after installing new heating system and individually trapping all mains, risers, coils and unit heaters with Armstrongs. —*L. C. Balfour Co., Attleboro, Mass.*

•

SAVE 3728 GALLONS OF FUEL OIL annually after installing Armstrong traps on kettles and other equipment. —*Mary Lincoln Candies, Inc., Buffalo, N. Y.*

•

33⅓% REDUCTION IN ANNUAL COAL BILL after installing Armstrong traps on cooking vats.—*Ralph L. Smith Lumber Co., North Kansas City, Mo.*

•

100 TONS OF COAL per year saved due to Armstrong traps on heating coils in drying kilns.—*Northwestern Store Equipment Co., Milwaukee, Wis.*

FUEL BILLS TAKE A NOSE DIVE



When You Unit Trap with Armstrongs

Any plant operator or engineer may ask, "Why should I expect to save fuel if I invest in Armstrong Unit Trapping?" The answer is simple:

1. *Armstrong traps can't leak steam*—the hardened chrome steel valve and seat are ground and lapped to a precision, steam-tight fit; they are water sealed at all times. When steam enters the trap, the bucket floats and closes the valve. Full steam pressure against the valve holds it closed—*tightly!*

2. *Non-productive radiation losses minimized*—with Armstrong traps on the job, the steam gives up more heat through the machine, less through the supply and return lines. Air and condensate is discharged as rapidly as it accumulates; heat transfer efficiency in the machine is greater; flow of steam in is more rapid; condensate is discharged at steam temperature—no "cooling legs" needed.

3. *Faster Production*—because Armstrong traps keep equipment HOT, drying, evaporating, cooking, heating and other processes are faster. It takes less steam when it takes less time to complete a heating cycle.

But, the "reasons why" make dull reading compared to the PROOF—see the column at the left. For recommendations and prices on traps for each piece of equipment in your plant send for the 36-page ARMSTRONG STEAM TRAP BOOK.

ARMSTRONG MACHINE WORKS
858 Maple Street • Three Rivers, Michigan

ARMSTRONG *Inverted Bucket* STEAM TRAPS

Sold Under a "Satisfaction-or-Your-Money-Back" Guarantee.

TYGON PLASTIC PAINTS DIFFER FROM ANY PAINT YOU'VE EVER USED

With most paints the film is formed or cured by the absorption of oxygen by the paint molecules. This process of oxidation doesn't stop, however, when the film is formed but continues on, and on, eventually to destroy the film it helped create.

Tygon Plastic Paints are completely unaffected by oxidation, the destructive force that causes ordinary paint films to check, crack, craze, and chalk-off. The *all*-plastic Tygon Paint film remains chemically unchanged, regardless of age.



That's why the chemical industries specify TYGON PAINT, the all-plastic protective coating, for walls, structural steel, tanks, fans, ducts, machines, pipe and other equipment exposed to chemical attack.

They have learned from experience that Tygon Paints give up to three or four times the maintenance-free life of other type coatings . . . that Tygon Paints provide real protection against even the most corrosive conditions.

Write today for your free copy of Bulletin 789—or better yet, why not place an order for Tygon Paint Test Kit: 1 pint of Tygon TP-108 Primer, 1 pint of Tygon TP-110 Concrete Primer, 1 pint of Tygon TP-111 Wash Primer, 1 quart Tygon TP-12 light grey finish coat, all complete with necessary thinners and full instructions. Price only $5.00 F.O.B. your plant.

U. S. STONEWARE

Since 1865 · Akron, Ohio

THE Chementator

Reg. U. S. Pat. Off.

COMMENTS ON THE NEWS OF CHEMICAL ENGINEERING IN INDUSTRY

April 1949, Volume 56, Number 4

Dead Sea comes to life

Palestine Potash Ltd. plans to resume production of potash as soon as the Israel-Transjordan armistice is signed. Royalties will go to Israel and Transjordan.

The plant at the southern end of the Dead Sea—biblical Sodom—is undamaged. It is in Israeli territory. It will turn out about 70,000 tons of potash a year.

Seventy-five-year concession was granted to Palestine Potash in 1930 by the British mandatory government to develop and exploit Dead Sea mineral resources.

Messer Chemical Construction Corp. of New York has been engaged to plan maximum exploitation of the Dead Sea.

Cuba lowers the boom

After delivering about half of the 80 million gallons of molasses it had promised to Publicker Industries, Inc., the Cuban Sugar Stabilization Institute abruptly rescinded its contract.

Price of molasses had been pegged to that of alcohol. Reportedly, Publicker had been paying the Cubans for the molasses 22½ percent of the going price of ethyl alcohol.

It was this contract, together with Shell's production of synthetic ethanol and a bad case of jitters in the alcohol industry, that touched off the price war.

Bearing down on Russia?

Has the U. S. refused to grant licenses for the export of penicillin equipment to Russia's satellites? Poland, Czechoslovakia and Yugoslavia apparently have been unsuccessful in getting penicillin equipment from the U. S.

At Geneva, the UN's World Health Organization is taking steps to procure the equipment from the U. S. Such procurement, the U. S. representative on the executive board contends, is not an appropriate function of WHO.

Eastern delegates, however, are threatening to walk out of WHO, as representatives of Russia, Byelorussia and the Ukraine did earlier, unless the UN agency helps them get the penicillin equipment.

Propaganda weapon will be made of the issue by the Russian satellites. They are sure that the U. S. will have a hard time convincing the world that shutting off vital medicines is essential to U. S. security.

"Security considerations," however, are the only explanation offered by Francis E. McIntyre, assistant director of the Office of International Trade, Department of Commerce, who is in charge of export controls. Security considerations, that is, and a cryptic "no further comment."

Satellites charge that both penicillin and streptomycin, as well as machinery for their manufacture, are being embargoed by the U. S.

Critical items are Podbielniak converters, made only in the U. S. They are essential to the production of crystalline penicillin. But large-scale production of even amorphous penicillin, which is harder to handle and store, is held up, according to the Eastern delegates, by refusal of U. S. to sell spare parts.

Different version

Dr. Justin F. Wait, research chemist who was director of Merck's first big streptomycin plant and who served during 1936 and 1937 as a consultant in Russia, has a different version.

Russian plants, declares Wait, are able to produce adequate supplies of penicillin and streptomycin for the satellite countries of Eastern Europe without further help from the U. S.

He thinks Soviet leaders may have diverted Russian equipment to the manufacture of war materials instead of making the much needed drugs.

OAP to put chemical companies on the block

By the end of this summer the government expects to have sold the formerly enemy-owned Schering Corp., producer of hormones and other ethical pharmaceuticals. Way was cleared when a Swiss outfit dropped its claim to Schering, thus eliminating what had been an effective legal block to sale of the property by the Office of Alien Property.

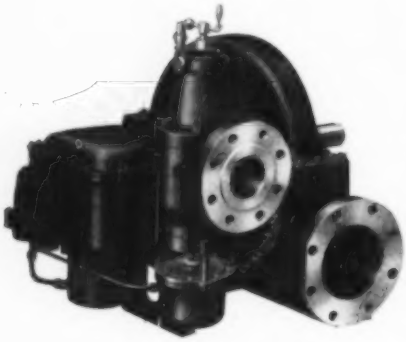
Schering Corp. has about 1,000 employees at its two New Jersey plants in Bloomfield and Union. It is estimated to be worth between $8 million and $10 million.

Other companies that OAP officials expect to sell within the next year or so: J. M. Lehmann Co., Lynd-

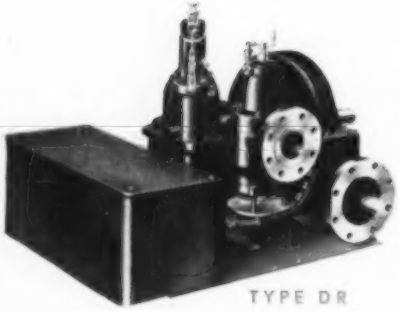
(*Continued on page 70*)

GENERAL ELECTRIC ANNOUNCES

A NEW STANDARDIZED



TYPE DP



TYPE DR

STANDARDIZATION EXTENDED

Last year General Electric announced what we believe to be the greatest value in small turbine history—the Type DP. This standard turbine, which offers a host of special features at no extra cost, is suitable for the great majority of applications within its speed and horsepower range.

For drives of higher speeds, or requiring wider speed range, or greater accuracy of control, the new oil-relay governed Type DR turbine is now available. This standardized design powers many drives which formerly could be handled only by a more expensive, custom-built unit.

To simplify maintenance, the Type DR is coordinated with the basic Type DP design to provide as much standardization of parts and dimensions as possible. For instance, bearings, packings, shafts, oil coolers, and many other parts are interchangeable on all frame sizes of both DP and DR units. Installation and re-location are simplified by a common shaft height and coupling fit.

By the selection of a Type DR drive, you get the advantages of a custom-built, oil-relay governed turbine, along with the ease of maintenance and handling offered by a standardized unit.

For assistance in applying the right turbine to the right job, get in touch with your G-E representative. He'll be glad to show you how the special features of G-E mechanical-drive turbines offer you extra value. Apparatus Department, General Electric Company, Schenectady 5, N. Y.

TURBINE!

FOR

HIGH SPEEDS,

WIDE SPEED RANGES, GREATER ACCURACY OF CONTROL



The new Type DR turbine is almost universally applicable within its range of ratings. Speed range under governor control is more than sufficient to handle all types of variable speed pumps, fans, compressors, blowers, stokers, and many types of paper machines. The accuracy afforded by the standardized, oil-relay governor even permits smooth parallel operation of a-c generators.

Ratings up to 1500 hp are available, with speeds from 1000 to 8000 rpm.

SAFE IN EXPLOSIVE ATMOSPHERES — non-sparking emergency governor standard on all units

LESS MAINTENANCE— Monel spraying of journals at packings reduces erosion and packing wear

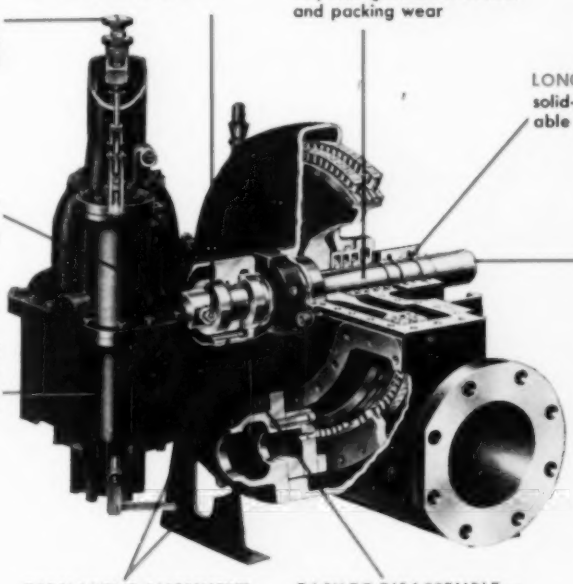
WIDE SPEED RANGE— powerful oil-relay governor provides adjustable speed range up to 5 to 1

LONG-LIFE BEARINGS— solid-backed interchangeable bearings

GREAT ACCURACY— steady state governor accuracy of ±¼ of 1 per cent

EASY TO INSTALL —standard shaft height and coupling fit permit installing and re-locating units with a minimum of effort

POSITIVE LUBRICATION —pump provides pressure lubrication for turbine bearings and, if desired, for driven equipment



PERMANENT ALIGNMENT —center-line support eliminates casing strains, keeps unit in alignment, reduces coupling wear

EASY TO DISASSEMBLE— casings and other parts secured by easy-to-handle socket-head cap screws, which replace conventional bolting

GENERAL ELECTRIC

hurst, N. J., manufacturer of rolling mills for the paint, soap, ink, and chocolate industries; and Buffalo Electro-Chemical Co., Buffalo, N. Y., maker of hydrogen peroxide.

These sales would be added to last year's sales by OAP of North American Rayon Corp. and American Bemberg Corp., rayon producers, to Beauknit Mills, Inc.; and Rohm & Haas, plastics and chemical manufacturer, to an underwriting group.

OAP's biggest plum

General Aniline & Film Corp. is the $100 million plum in OAP's sales pudding. And it is still involved in legal technicalities. The law governing disposal of enemy property provides that the property may not be sold as long as there is pending a court suit by anyone claiming legal ownership of the property.

Interhandel, formerly I. G. Chemie, a Swiss company, last fall filed such a suit, saying it is the legal owner of General Aniline and denying that it was either an enemy or an ally of an enemy of the U. S.

At the moment, it looks as though General Aniline & Film could be tied up in the courts for two years or longer. Reason: proving or disproving Interhandel's (or I. G. Chemie's) ties to I. G. Farben would take thousands of documents and much legal backing and filling by both sides.

Deal with the Swiss claimant was proposed by David L. Bazelon, OAP's boss, to short-circuit the long-drawn-out legal battle. It would have permitted OAP to sell GAF, with the proceeds going to the owner designated by the court. But the Swiss turned the deal down.

Action by Congress is OAP's other hope for speeding up disposal of GAF. Congress would authorize a disposal procedure that did not require the consent of the foreign claimant. Such a bill was passed in the House during the 79th Congress, but got lost in the Senate at session's end.

A similar bill (H. R. 1889) has been introduced this year by Representative Robert Crosser, Ohio Democrat, but there is no push behind it at the moment. Its chance of passing cannot be guessed.

Meanwhile, GAF keeps looking better and better to investors who have been keeping a close eye on the property. Since the government took it over, net profits have been running between $3 million and $5 million a year. GAF's 1948 earnings may even have reached $9 million or $10 million. This profit record, OAP officials think, shows that the company is doing all right under government ownership.

Its own research organization has finally been set up in GAF during OAP's stewardship. GAF's former owners had kept it from organizing an independent research function. In 1941, before the government took over, General Aniline spent only $13,000 for basic research. By 1947, it had an expanding research and development program supported by a $3.7 million budget. And 1948 expenditures were probably even larger.

OAP officials would like to get rid of GAF as soon as they can. They think the company provides needed competition in the chemical, photographic and dyestuffs industries. But they also feel that GAF is hampered in this competitive battle. Reason: its competitors can go to the money markets for capital to expand their operations.

Only in private hands can GAF expand in this fashion. So the quicker the government gets rid of GAF, the better for all.

Basing points

Almost sure to get through during this session of Congress is the moratorium bill on basing points. It is backed by top Democrats in both House and Senate.

The bill declares that it is not the intent of Congress to deprive individual companies of their right to use delivered pricing to absorb freight in meeting competition.

It provides that until July 1, 1950, the FTC is not to construe the anti-trust laws as depriving individual companies—in the absence of conspiracy or combination—of the right independently to use delivered-price systems to absorb freight to meet competition in any and all markets.

Science Foundation

Administration leaders have sponsored Science Foundation bills in both Senate and House. Already, the Senate has passed its bill unanimously. In the House, there is no apparent opposition.

Both bills provide for presidential appointment of the directors of the Foundation, with the advice and consent of the Senate. The director is specifically designated as the chief executive officer of the Foundation. These provisions meet the objections to the bill passed by Congress a year and a half ago which the President vetoed.

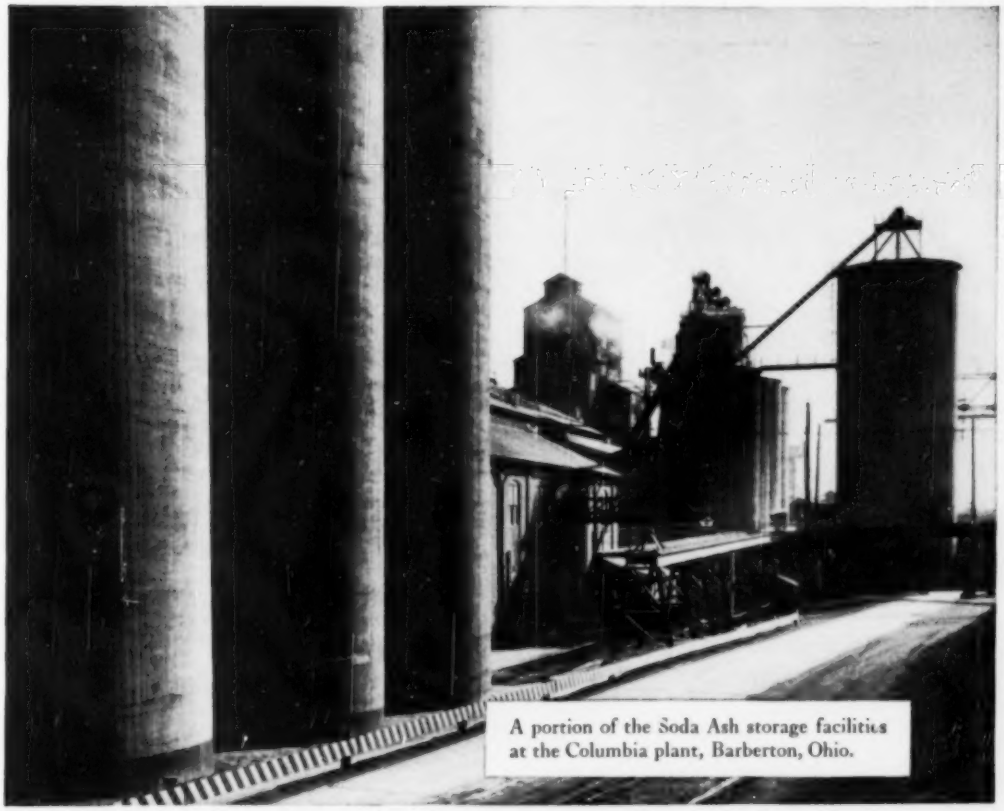
A Science Foundation would: (1) support basic research in the sciences and engineering through grants, loans and contracts; (2) award scholarships and graduate fellowships; and (3) foster interchange of scientific information with foreign countries.

Engineers battle for own bargaining units

Taft-Hartley Act provision gives professional employees the privilege of setting up separate bargaining units. Credit for this provision belongs to the Engineers' Joint Council.

The Administration's bill for revising the Taft-Hartley Act would now abandon the recognition

(Continued on page 72)



A portion of the Soda Ash storage facilities at the Columbia plant, Barberton, Ohio.

Here's why it pays you to use Columbia Soda Ash — Light or Dense

Made for Your Requirements—Columbia's original product; manufactured, since 1899, with intimate knowledge of the specific needs of all types of industrial applications.

Controlled Quality—Eliminates variables which can cause production difficulties. Highest standards maintained to produce Soda Ash which always tests 99-100% Na_2CO_3, with an Na_2O equivalent of 58% plus.

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Check your Soda Ash requirements with Columbia . . . you'll receive excellent service—another important factor in your operations.

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previously given professionals. So the EJC is back on Capitol Hill urging congressional committees to make no change in the present rule.

AIChE's representative on this panel is W. I. Burt, vice president of B. F. Goodrich Chemical Co. Spokesman for the group is E. Lawrence Chandler, assistant secretary of the American Society of Civil Engineers.

EJC's position is backed up by 10,000 engineers in 12 collective bargaining units certified by NLRB. Chandler estimates that another 8,000 engineers share the EJC view, making a grand total of 18,000.

Opponents of the EJC stand are an estimated 3,200 engineers who are members of the AFL's International Federation of Technical Engineers, Architects & Draftsmen or the CIO's United Office & Professional Workers. These two organizations are fighting hard to kill the present privilege accorded professionals.

Chances of saving the rule for professionals that is now in the Taft-Hartley Act in any new law are not good.

Wanted: chemical engineers

Demand for chemical engineers is likely to run ahead of supply for years to come, according to the Bureau of Labor Statistics.

Trained engineers with experience are still hard to find. Here is how BLS explains the shortage: (1) industries mushroomed during the war, new ones were born; and (2) engineering students went into uniform.

Enrollment in engineering schools since war's end, however, has climbed to three times the prewar figure. At Columbia University's School of Engineering, for example, enrollment reached a postwar peak of 1,100. James Kip French, dean of the school, has called for a cutback to 600 or 800 students.

Chemical engineering students have doubled in number since 1940 to about 30,000 in 1948, BLS reports.

But demand is still rising sharply due to: (1) growth of the chemical industry; (2) increasing use of chemical engineers in other process industries; and (3) expanding research and teaching demands. So despite the swollen student enrollment, there is apt to be a shortage for years yet.

Out go the sulphur compounds

Getting rid of the sulphur compounds in synthesis gas is a ticklish business. A careful eye must be kept on the cost of this important step. This problem is being studied at the Louisiana, Mo., coal gasification plant of the Bureau of Mines. It is one of the clues to cheap fuels from coal.

Synthesis gas is a mixture of hydrogen and carbon monoxide which also contains sulphur compounds. With some coals, the synthesis gas produced may have as much as 600 grains of H_2S per 100 cu. ft. Getting rid of this H_2S would be easy if it were not for: (1) the presence of small amounts of such organic sulphur compounds as COS and CS_2; and (2) the presence of about 10 percent CO_2.

An absorption plant designed by Girdler will remove 98 percent of the H_2S. At the same time only about one-third of the CO_2 is removed.

Triethanolamine is used in the absorption plant to remove the bulk of the H_2S. A 50 percent aqueous solution is employed. The residual 5 to 15 grains of H_2S is separated by dry-box purification.

Organic sulphur compounds are next removed. About 0.1 to 0.2 percent of oxygen, or its equivalent amount of air, is added to the synthesis gas. The gas at about 500 deg. F. passes over a granulated mixture of soda ash and iron oxide. Result: organic sulphur compounds are oxidized to sulphates which remain in the treating mass as sodium sulphate.

Purified gas going to the synthesis reactors must contain not more than 0.1 grain of total sulphur per 100 cu. ft. During the synthesis reaction CO_2 is generated. Removing most of this CO_2 between reaction stages makes the synthesis process more efficient.

Another absorption unit, also designed by Girdler, removes this CO_2 between stages. It operates at 450 psi. and utilizes a solution of monoethanolamine. This Girbotol process is cheaper than high-pressure water scrubbing; moreover, it side-steps the substantial solution losses of synthesis gas that occur in water scrubbing.

Button, button, who's got the coal?

Purchase of coal land in southern Ohio has been denied by Union Carbide & Carbon. The coal deposits could be strip-mined.

Ferro-alloy plant, to be built by Union Carbide at Marietta, Ohio, would gobble up the coal as fuel, according to the report denied by Carbide.

Construction of the Marietta plant has not even started yet. When the plant starts running, it will need 600 employees.

Option rights on 7,000 acres of deep coal land in Meigs County have been exercised by Carbide, however, according to the administrator of the estate of the late Capt. John Lyons. Edison Hobstetter, administrator of the Lyons estate, indicate that the purchase price may go above six figures.

For acetylene, new vistas

New pilot plant of General Aniline & Film Corp. at Grasselli, N. J., is devoted to exploration of acetylene reactions at pressures and temperatures hitherto unattempted in the U. S.

Techniques for handling acetylene at high tem-

(*Continued on page 74*)



As the white outline indicates, a standard unit of more than double the frame size would be required to do the work of Speedaire.

Latest in a distinguished series, SPEEDAIRE saves $407

FOR 25 years, this plastics manufacturer has used Cleveland Worm Gear Speed Reducers. On the left you see one of our earliest standardized worm units, driving a rod extruder. In the center background is a current standard reducer, and in the foreground is a Speedaire.

All three Cleveland units do similar jobs, driving extruders. Yet compared to the standard model of equivalent capacity, Speedaire occupies less than half as much space, reduces weight by 700 pounds, and saves $407.00 in initial cost.

Speedaire is Cleveland's new fan-cooled worm-gear speed reducer. Because it is fan-cooled, Speedaire will do more work —will deliver up to *double the horsepower* of standard worm units of equal frame size, at usual motor speeds. It can be installed economically on many applications where other types have been used heretofore—giving you the advantages of a compact right-angle drive. Speedaire gives the same long, trouble-free service characteristic of all Clevelands.

Send for Catalog 300 for a full description. The Cleveland Worm & Gear Company, 3275 East 80th Street, Cleveland 4, O.

Affiliate: The Farval Corporation, Centralized Systems of Lubrication. In Canada: Peacock Brothers Limited.

CLEVELAND
Worm Gear
Speed Reducers

peratures and pressures were pioneered in Germany by I. G. Farben's Dr. J. Walter Reppe. Now GAF has improved upon these techniques. Two methods are used: (1) dilution of acetylene with an inert gas; or (2) use of acetylene in equipment with no free empty spaces of cross-section greater than 0.25 sq. in.

Vinylation is the introduction of a vinyl group by reaction with acetylene. The new reaction, vinylation of alcohols, is relatively straightforward; yields from most primary alcohols are almost quantitative. Process runs as follows: alcohol to be vinylated is mixed with an alkaline catalyst and heated with acetylene diluted with nitrogen under a total pressure of about 150 to 200 psi. The product, vinyl alkyl ether, is then degassed of excess acetylene and rectified. Mercaptans, amines and higher fatty acids can also be vinylated. Thus the vinylation process is highly flexible. Moreover, it has the advantage of being a single-step process.

Ethynylation, the condensation of acetylene with a reagent such as an aldehyde so that the triple bond of acetylene remains intact, requires special safety techniques for handling the compressed acetylene, since the dilution method cannot be used. Here is how the process works: dilute aqueous formaldehyde is mixed with undiluted acetylene at 90 psi. and passed over a copper acetylide catalyst containing bismuth to prevent formation of cuprene. Products are degassed, any unchanged formaldehyde and propargyl alcohol distilled off, and the main product, butynediol, obtained as a concentrated water solution, from which it is isolated as a colorless crystalline solid.

Vinyl ethers are thus made available by GAF through a one-step process and, hence, may greatly affect the adhesives and plastics industries. These products also have unusual possibilities in chemical syntheses not feasible via acetaldehyde or vinyl acetate.

Butynediol becomes potentially available at a low cost. It will undoubtedly have a profound effect on the synthetic fiber and resin industries. It is also the key to commercial production of a variety of chemical intermediates, including heterocyclic compounds hitherto economically inaccessible.

GAF's pilot plant, therefore, is the first concrete expression in the U. S. of confidence in the importance of high-pressure acetylene as one of tomorrow's chemical building blocks.

Two ways to make chloromycetin

While the new antibiotic plant of Parke, Davis & Co. at Detroit could be used for the manufacture of penicillin, it was planned with the idea of making streptomycin. Now, however, the unit is turning out chloromycetin, an even newer antibiotic developed by Parke Davis.

Flexibility of design in the new antibiotic unit at Detroit made production of chloromycetin possible. Plant and equipment are among the most efficient and versatile manufacturing antibiotics.

Biological method is employed in the new unit to produce chloromycetin. But Parke Davis is too smart to put all its eggs in one basket.

Chemical synthesis is also used to manufacture chloromycetin. Manufacture by the chemical process is carried out, not in the new antibiotic unit, but in another part of the Detroit plant. Thus is Parke Davis beforehand in proceeding along the synthesis route.

King size

New resin plant of U. S. Industrial Chemicals at Newark, N. J., is now in production. A whopper, said by USI to be the biggest in the world, it can turn out 100 million pounds of resins a year.

Soaps vs. synthetic detergents

The soap sales bubble burst last year. In 1948 soap sales were off 11 percent from 1947. The reason: synthetic detergents had muscled in on the market.

But this did not presage a knockdown-drag-out fight between the soap makers and the producers of synthetics. Most soap makers, hedging on the market, are already producing detergents. Only the chemical manufacturers who make the synthetics alone have an all-or-nothing stake.

Three years ago synthetic detergents held only 2 percent of the household market. Today they account for 25 to 30 percent of it.

This year output of detergents should exceed 650 million pounds.

By 1952 detergent makers expect to be selling close to 1 billion pounds a year. Beyond that, expansion will be slow. Detergents will not replace soap products; but they will supplement soap stocks in most homes. Eventually, sales of the two should run 50-50.

New catalyst for cat crackers

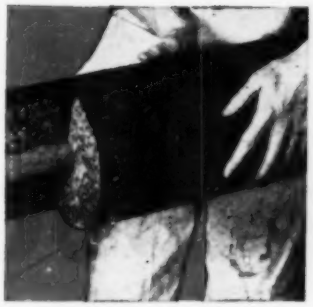
Until recently, only two types of catalysts have been used in commercial fluid catalytic cracking units. But Indiana Standard's researchers have been testing other kinds of catalysts.

Synthetic silica-magnesia is the most promising of them. After ten years of experimental work on the new catalyst had shown favorable results, full-scale trials were made in a commercial fluid-process cracking plant running a million gallons of oil a day.

Higher gasoline yields have been achieved with the new catalyst. Octane number is lower, but tetraethyl lead offsets this. The synthetic silica-magnesia catalyst stays active for an unusually long time. It requires one-third less make-up than ordinary catalysts because it is mechanically stronger. —*End*



1. The pipe has first been thoroughly cleaned. Here Armstrong's Waterproof Cement is being applied.



2. Sections of cork covering are tightly butted against each other. Longitudinal joints at top and bottom.



3. The covering must hug the line snugly. It is held in place with copper-clad steel wire, drawn tight.

How to get a good cold line insulation job

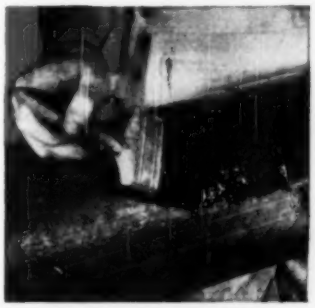
The combination of good material and workmen who know how to apply it properly is your best assurance of long and efficient performance from cold line insulation. Workmanship is extremely important, for poorly applied insulation means needless waste of expensive refrigeration. The slightest opening in any joint allows heat to flow in and moisture to condense in the break. If this moisture freezes it exerts a pressure that enlarges the opening and may damage the insulation itself.

Shown here are five of the important steps in doing a good cold line insulation job—a job that with proper maintenance will last for many years and keep cost of refrigeration down. The insulation being used is Armstrong's Cork Covering, a material whose low thermal conductivity and general all-around durability have made it the standard of comparison among cold line insulations. It is being applied by one of the skilled workmen of Armstrong's Contract Service.

For an estimate on the cost of insulating a low-temperature line the way it should be done or for full information on Armstrong's Cork Covering, call the Armstrong District Office nearest you or write direct to Armstrong Cork Company, Building Materials Div., 3304 Concord St., Lancaster, Pa.



4. All joints are carefully pointed up and sealed with Armstrong's Seam Filler to keep out vapor.



5. The completed job gets a good coat of Armstrong's Cork Covering Paint.

- **DON'T** apply insulation when the line is cold or wet.
- **DON'T** try to save money by using untrained workmen.

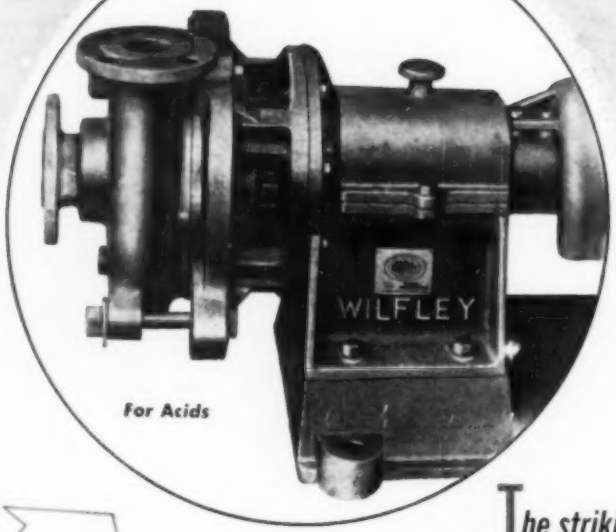
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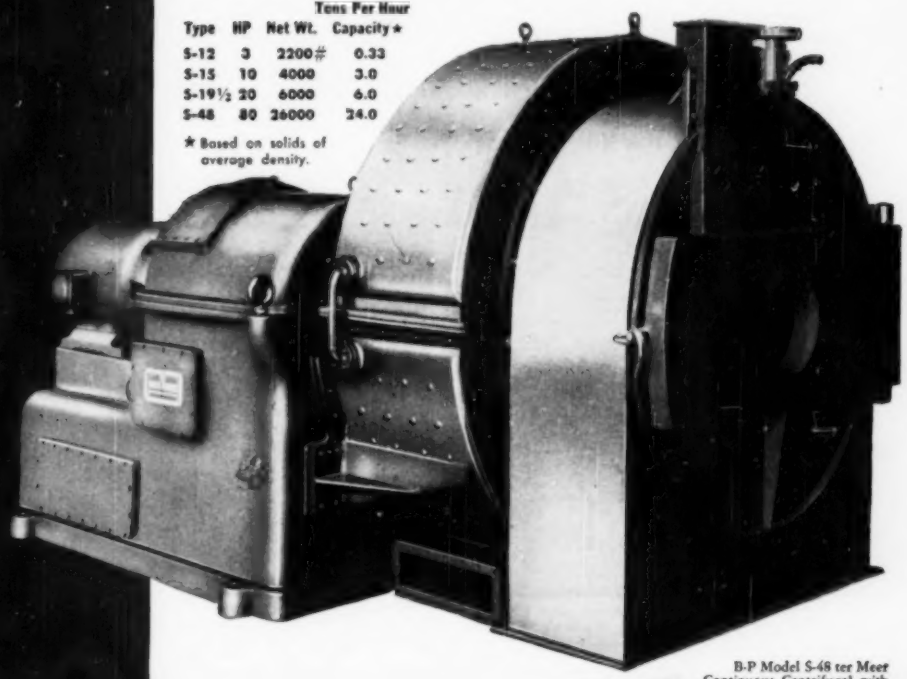
NEW TYPE "S" B-P TER MEER CONTINUOUS CENTRIFUGALS

speed production of free draining slurries

The new Baker Perkins Type "S" ter Meer Continuous Centrifugals now de-water greatly increased quantities of free draining crystalline, granular and fibrous materials. The new Model S-48, for example, can now de-water up to 24 tons of material* per hour, as compared with 8 to 10 tons per hour in the old model. Other re-designed models have *increased production capacities on an average of 50 per cent.* These new B-P Centrifugals have jacketed wet housings as optional equipment in which hot or cold liquids or gasses can be circulated for controlling working temperatures. An inspection door in the discharge chamber can be opened for close observation of centrifuging while the machine is in operation and makes the machine readily accessible for cleaning.

Type	HP	Net Wt.	Tons Per Hour Capacity ★
S-12	3	2200#	0.33
S-15	10	4000	3.0
S-19½	20	6000	6.0
S-48	80	26000	24.0

★ Based on solids of average density.



B-P Model S-48 ter Meer Continuous Centrifugal with 48" drum; develops 250 x G with 50 HP drive motor; and 30 HP oil pump motor. Write for complete information.

BAKER PERKINS INC.

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STEAM GENERATORS—FOR POWER AND PROCESS

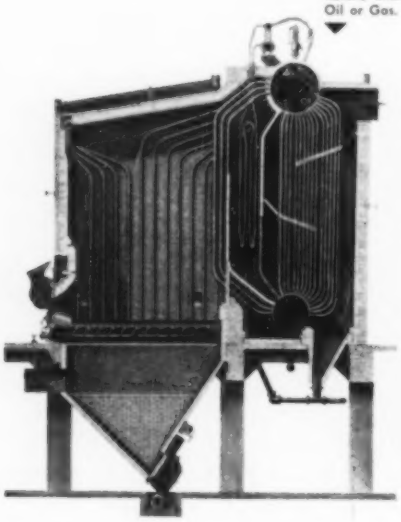
In every part of the country, in every kind of chemical and process plant, the C-E Steam Generator, Type VU is proving itself an economical and dependable source of steam. At the present time, the aggregate capacity of these units installed in all branches of the process industries is well over 40,000,000 lb of steam per hr.

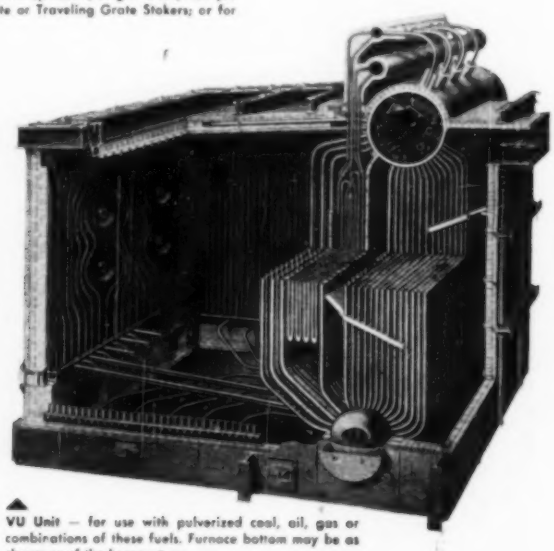
The reasons for the wide acceptance of this unit are simple enough. It is compact, efficient and reliable. It handles fluctuating steam demands quickly and easily. It performs well with all types of firing – pulverized coal, oil, gas or combinations of those fuels as well as with all types of stokers.

Furthermore the range of capacities is broad enough to serve the requirements of every type of process plant. Installations *now in service* vary in capacity from 10,000 to 325,000 lb of steam per hr, with pressures from 200 to 1000 psi and temperatures to 900 F.

As you would expect the VU Unit operates in the process industries under a wide variety of conditions. And it has made an enviable reputation for dependable performance regardless of the service required. Why not investigate the possibilities of the VU Unit for your plant the next time you are in the market for steam generating equipment.

VU Unit — for use with Spreader, Single Retort, Multiple Retort, Chain Grate or Traveling Grate Stokers; or for Oil or Gas.





VU Unit — for use with pulverized coal, oil, gas or combinations of these fuels. Furnace bottom may be as shown or of the hopper type.

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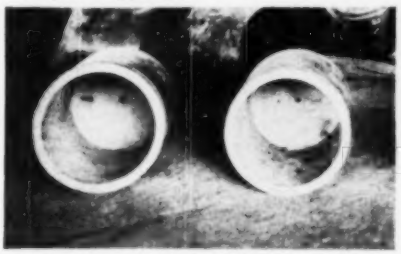
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The fabrication of pressure vessels of various sizes and shapes necessitates manufacturing facilities and methods identical with those required for boiler manufacture. Combustion Engineering—Superheater is, therefore, exceptionally well qualified for such production, from small classes of work to the largest and heaviest pressure vessels employing any type of carbon, alloy or clad steel. Combustion's facilities for forming, machining, welding, X-raying, stress relieving and heat treating are unsurpassed.

In addition to these extensive manufacturing facilities, Combustion offers you years of experience in this highly specialized field — experience in actually producing thousands of these vessels, simple and complex—large and small. Whatever your pressure vessel requirements may be, you can depend on the facilities and experience of Combustion Engineering—Superheater to meet your needs. B-306



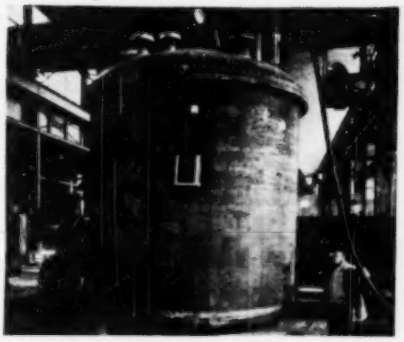
A group of air bottles, 16" O. D. x 54" long; made for 900 psi working pressure.



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Nickel-clad steel processing vessel for the manufacture of plasticizing materials.

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C-E

the very idea!

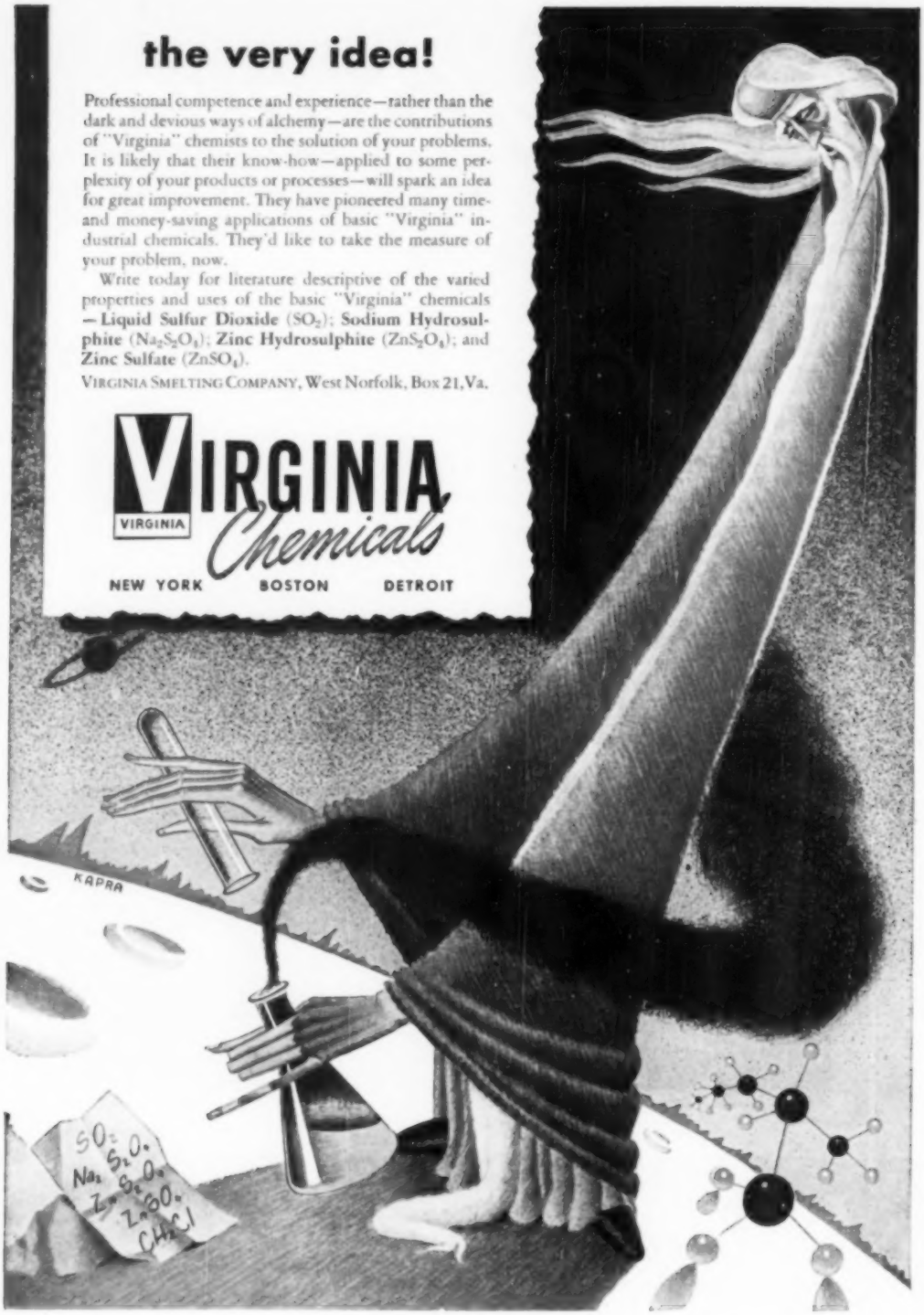
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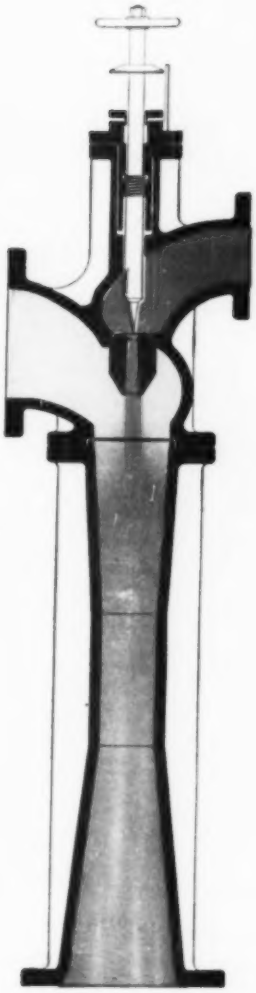
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Exide-Ironclad Batteries are DIFFERENT . . . different in design . . . different in construction . . . different in service qualities. Chief among these differences is the unique positive plate, an exclusive Exide feature, which provides advantages not possessed by any other type of plate used in batteries for motive power service. See opposite page for detailed description.

DESIGNED FOR STATIONARY USE



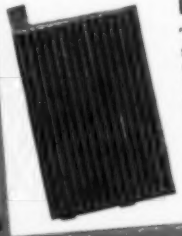
The manchester type of positive plate has the unique lead button construction...rolled strips of corrugated lead, pressed into holes of lead antimony grid. It is widely used by electric utilities, telephone and telegraph companies, radio and television stations... and for railway signal systems, emergency lighting and other stationary applications.

DESIGNED FOR AUTOMOBILE USE



The Exide flat positive plate is of staggered grid construction, pasted with active material which years of experience has proved most efficient and durable for the services for which it was designed. Used for starting, lighting, ignition and other services in cars, trucks, buses, aircraft and general storage battery tasks.

DESIGNED FOR MOTIVE POWER



The Exide-Ironclad positive plate, of slotted tube construction, was developed by Exide Engineers to provide a battery of extra power, sturdiness and durability to meet the exacting needs of motive power equipment. Exide-Ironclad Batteries are noted for high capacity and ability to deliver adequate power throughout each shift. Fully described on opposite page.

1888

DEPENDABLE BATTERIES FOR 61 YEARS

1949

Many Outstanding Features

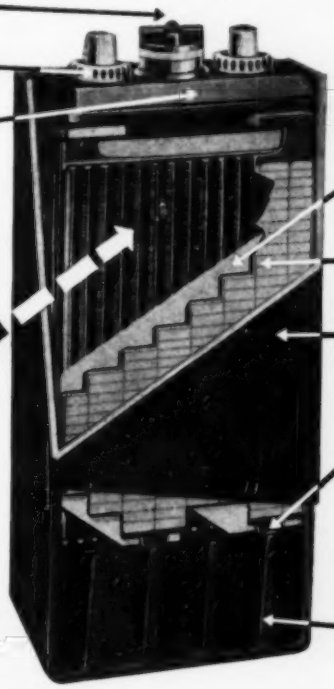
VENT PLUG
Specially designed to prevent escape of electrolyte.

GREASE SEAL RING NUT
Holds battery elements securely in place . . . prevents creepage of electrolyte . . . keeps tops clean and dry.

SEALED CELL COVER
Flush with top of jar. Prevents collection of dirt or moisture . . . keeps impurities out of cell . . . eliminates leakage of electrolyte.



Consists of a series of finely-slotted tubes which contain the active material. So small are these slots that, while permitting easy access of electrolyte, they retard the active material from readily washing out or jarring loose . . . adding considerably to life of plate.



SEPARATOR
Of high porosity, specially treated to last the life of the battery.

NEGATIVE PLATE
Made extra heavy and built to match the long life of the positive plate.

JAR
Made of specially tough and durable Giant Compound. Built to withstand the jolts and jars of hard industrial usage. Practically unbreakable in normal service.

FEET
Internal short circuits practically eliminated by having the two feet on negative plate rest on different ribs from those of the positive plate, and by having separators extend below both plates and rest on all four ribs.

RIBS
Support all plates and separators. Their height provides generous sediment space, so that internal cleaning is unnecessary.

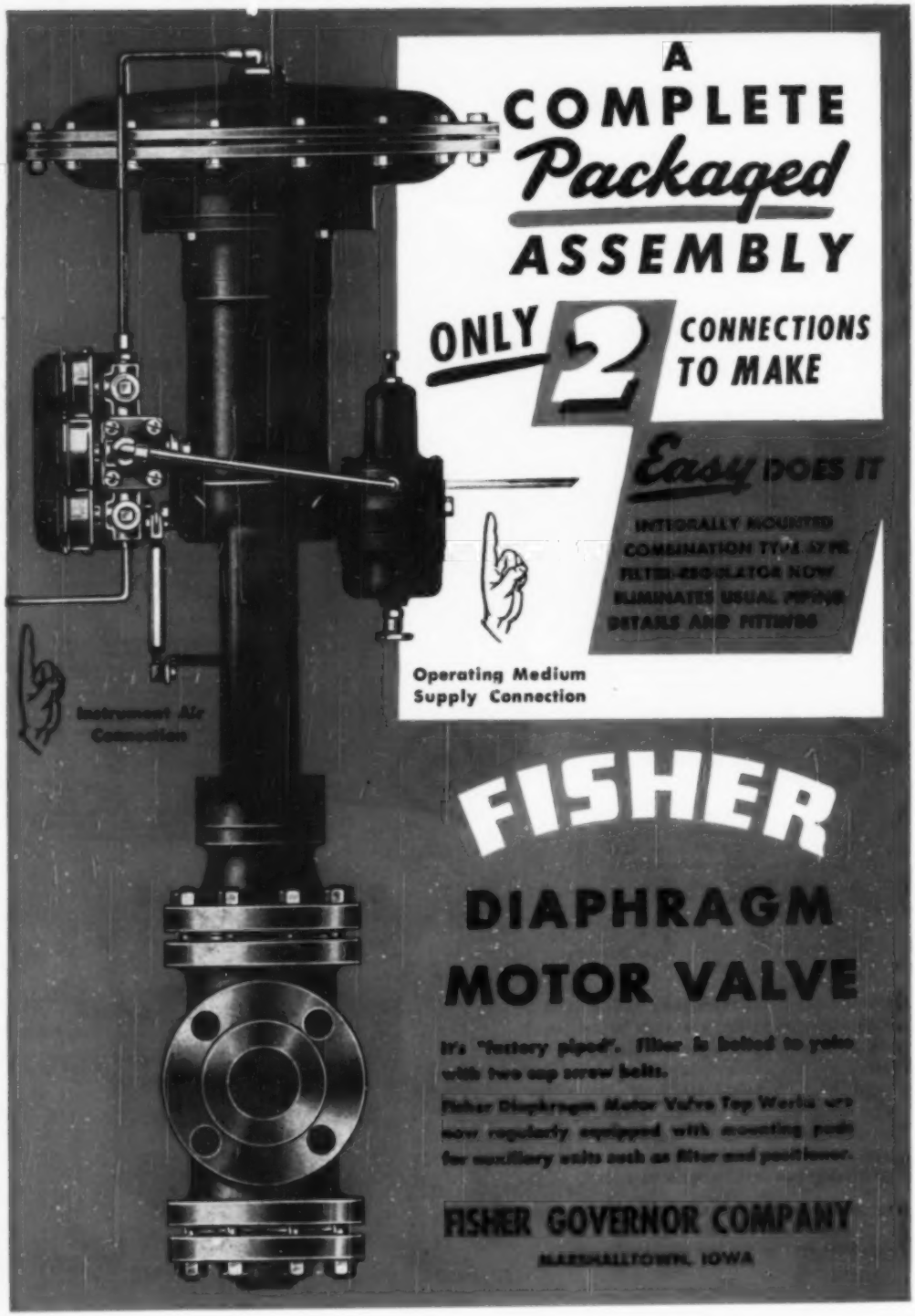
DEPENDABLE POWER



Exide-Ironclad Batteries have ALL FOUR of the characteristics that a storage battery must have to assure maximum performance from battery electric industrial trucks—high power ability, high electrical efficiency, ruggedness and a long life with minimum maintenance. The combination of these four Exide-Ironclad characteristics assures years of dependable day-in, day-out service with economy.

THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia 32
Exide Batteries of Canada, Limited, Toronto

"Exide" and "Exide-Ironclad"
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Packaged
ASSEMBLY
ONLY 2 CONNECTIONS TO MAKE
Easy DOES IT
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ELIMINATES USUAL PIPING
DETAILS AND FITTINGS
Operating Medium
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MOTOR VALVE
It's "factory piped". Filter is bolted to yoke with two cap screw bolts.
Fisher Diaphragm Motor Valve Top Works are now regularly equipped with mounting pads for auxiliary units such as filter and positioner.
FISHER GOVERNOR COMPANY
MARSHALLTOWN, IOWA

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or in the pioneering of any new industry.

Niagara Alkali Company, a pioneer in the field of electro-chemistry in America has always held steady in the development of high-quality products. And, through the years, Niagara has always kept its aims in proper focus and has always had the courage and willingness to try new methods and techniques in manufacture and servicing.

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CONTINUED acceptance by industry leaders like these vouches for the quality and performance of the *ElectroniK* Potentiometer . . . the instrument that is built *up to a standard, not down to a price!*

Available *with or without automatic standardization!*

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ESTABLISHED 1902 SIDNEY D. KIRKPATRICK, Editor

Chemical Engineering

WITH CHEMICAL & METALLURGICAL ENGINEERING

APRIL 1949

Our Research Dollars

Today the federal government is spending over a billion dollars a year on scientific research and development. Considerably more than half of this huge sum goes to the military services that sponsor or control some 18,000 different projects. In the considered opinion of the Committee on the National Security Organization, headed by Ferdinand Eberstadt and reporting to the Hoover Commission, we are "not getting full value from these expenditures."

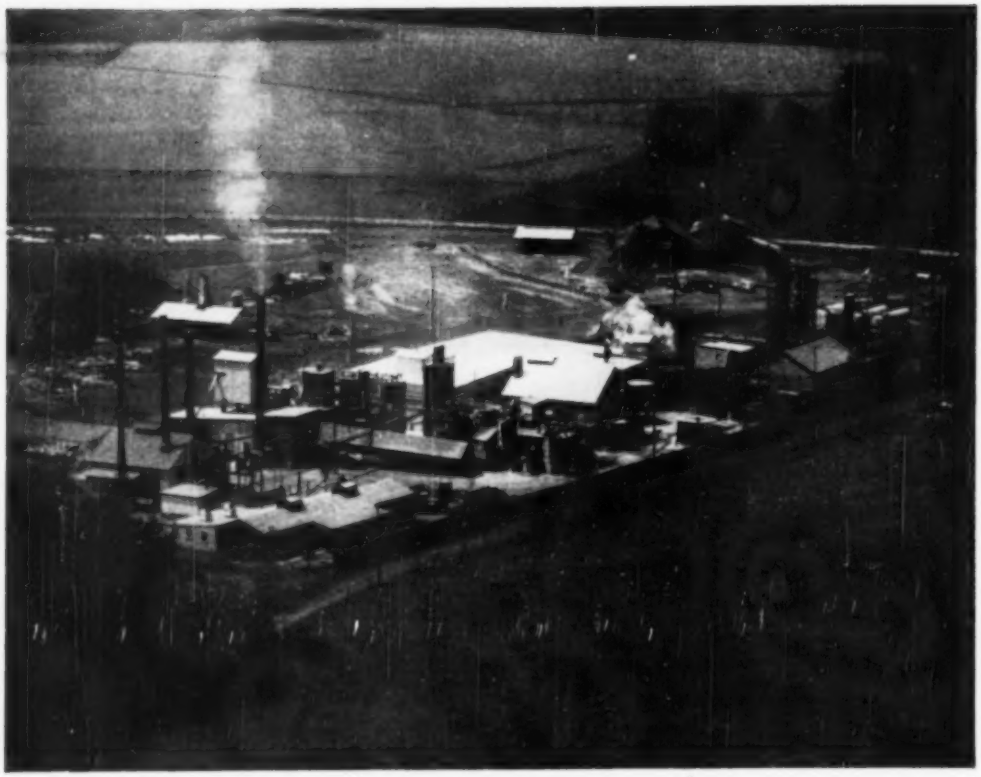
But more important than saving money are the risks to the national security that will follow our failure to develop and utilize fully the advances being made in both military and civilian science. Congress placed this responsibility squarely on the doorstep of the Research and Development Board when in 1947 it prescribed as the board's first duty "to prepare a complete and integrated program of research and development for military purposes." Unfortunately, however, the same law failed to provide authority over the one control that could have fitted these conflicting and competing services into any kind of a master plan. That primary instrument of correlation is, of course, control of the purse strings.

At present the various research budgets of the different services reach the R&D board as *faits accomplis*. Furthermore they follow such widely differing patterns, with so many variations in accounting practice, as to make it virtually impossible to find out how and where the money is being spent. Even with the best intentions of cooperation among the heads of the separate research agencies, the board "has experienced great difficulty in acquiring the scientific information that is indispensable if its work is to be sound and safely done."

So the committee in its recommendations to the Hoover Commission and to the Congress has been insistent that adequate powers be vested in the chairman of the Research and Development Board to review the research budgets of the three military services and to advise and aid the Secretary of Defense in supervising their expenditure. It also insists that the chairman should sit with the joint chiefs of staff when matters involving research and development are under consideration in order to make certain that close and continuously reciprocal arrangements are established between the two agencies at all working levels. One of the most desirable and urgent objectives of such an arrangement would be to establish a joint weapons systems evaluation group, which the Eberstadt committee holds is "an absolutely essential basis for proper military-scientific planning."

But this piercing report is not all concerned with organizational details and housekeeping. It finds, as we have suspected, that the service research programs and appropriations are often in excess of available technical manpower, and that there is now no over-all authority to bring them into line. It finds that some departments—notably the Office of Naval Research—are doing an admirable job of sponsoring truly basic research by contracts with universities and other institutions. Yet the impact of these contracts presents a number of serious problems. Frequently, they result in major changes in the fundamental economy and financial structure of these institutions. So the committee warns of the dangers that can result from federal subsidies to educational institutions for non-educational purposes.

None of us begrudges the millions that must go into research for our national security. It is probably a better investment than putting the same money into compulsory military training. But as taxpayers we have the right to insist that our research dollars should not be wasted in blind duplication among overlapping and competing agencies within the military establishment. For that reason we applaud the efforts of the Hoover Commission and its expert task forces.



BARIUM CHEMICALS

Barium carbonate and barium chloride are the plant's main products. Here the carbonate (it might be either of two grades) is being bagged.

SULPHIDE BYPRODUCTS

Sodium sulphide coming off flake dryer into shipping drums. Plant also makes ammonium sulphide from byproduct hydrogen sulphide.

CHLORINATED BENZENES

Distillation columns and associated storage tanks for production of monochloro, orthodichloro and paradichlorobenzene.







The Plant That Barite Built

Starting with nearby deposits of barium sulphate, Chemical Products Corp. has developed a highly integrated process (flowsheet page 128) with three classes of salable product

E. DALTON WHITE

SITUATED in the rich barite region around Cartersville, Ga., Chemical Products Corp. has grown from a modest beginning in 1933 to become an important factor in the expanding chemical industry in the South. Profits from operations have been used to expand facilities and to fabricate a great portion of its equipment in its own shops.

The company is within 300 or 400 mi. of its primary source of raw materials, other than barite, which is within short truck hauling distance. The savings in freight on raw materials, especially on barite ore, have enabled the company to compete in most available markets at a good economic level. Virtually all shipments move in carload quantities.

In the development of new products the company has followed a policy of working in small batch-type units. While these are small enough to serve as pilot-plant units, they give sufficient production to explore the market and to be partially self-sustaining. The experience and the development of techniques have led to redesign of these processes to give greater production with resulting increases in efficiency and quality. Where there is sufficient volume, the company has introduced continuous or semi-continuous processes. Processes have been developed for converting by-products from one part of the plant into finished chemical products. This has enabled the company to reduce its waste to insignificant quantities. At the same time the company has expanded its line of products and is continuing its research to develop new products and new uses.

The temperate climate in the Cartersville area has made it possible for the company to locate most equipment outdoors, with only the finishing processes and storage concentrated in buildings. This has resulted in a considerable saving in building cost. Compactness of the plant has reduced piping and conveyor requirements.

Mr. White is the McGraw-Hill correspondent in Atlanta, Ga.

PRODUCT DIVERSIFICATION

Expanding its activities, the company has as its objective the achievement of greater diversification by the manufacture of additional products. The company has excellent sales diversification because so many industries consume the products manufactured. The products manufactured and typical fields of application include:

1. Barium carbonate—which is used in enamel frit, brick manufacture, brine purification, oil well drilling, case hardening compounds and other chemicals.

2. Barium chloride—which is used in organic colors, photographic supplies, magnesium metal, brine purification and salt baths for metal heat treating.

3. Sodium sulphide—which is used in cotton textiles, rayon, leather, paper, ore refining and chemicals.

4. Ammonium sulphide—which is used in the manufacture of rayon and chemicals.

5. Monochlorobenzene—which is used in insecticides, solvents and chemical intermediates.

6. Orthodichlorobenzene—which is used in solvents, metal cleaning compounds, termite control and chemical intermediates.

7. Paradichlorobenzene—which is used in deodorants, insecticides and chemical intermediates.

REDUCE BARITE

The company secures its barite ore from a local mine in a form directly suitable for kiln operation. Ore analyzes above 96 percent barium sulphate with approximately 0.6 percent iron. Other impurities are silica and aluminum, together with traces of strontium, calcium and magnesium. The ore is sized to below about 12 mesh, with as little −200 mesh as possible. The ore is received practically bone-dry at the plant and is stored in a watertight bin of approximately 100 tons capacity.

From the storage bin the ore is moved by a bucket elevator to a feed bin of about 15 tons capacity. From this feed bin the ore is fed continuously over a Syntron gravimetric feeder to a bucket elevator where it is mixed with crushed coal. The coal has the highest possible fixed-carbon content and contains as little ash as possible. The coal is fed over another Syntron feeder. Coal and ore go to the reduction kiln, and with a small excess of

fixed carbon added, the following reaction occurs:

$$BaSO_4 + 4\,C \rightarrow BaS + 4\,CO$$

Hourly feed of ore to the natural-gas-fired 6 x 60 ft. kiln is approximately two tons. The mixture of ore and coal is fed into the rear of the kiln through a water-jacketed pipe and travels forward continuously counter to the heat supply. Extreme care is exercised in the maintenance of a reducing atmosphere in the kiln. This is controlled by the air supply to the gas burner and by regulation of the damper in the kiln stack.

Ore feed is at a rate very much on the high side of kiln capacity. This reduces the retention period in the kiln to such a point that a fairly high temperature is required. A temperature of approximately 2,300 deg. F. is required to hold the unconverted ore below 1 percent at the above rate of feed. Temperature readings are made with an optical pyrometer.

LEACH OUT BARIUM SULPHIDE

After a retention period of about two and one half hours the hot black ash is discharged onto a drag chain which elevates it to a series of agitated leaching tanks. These are brick-lined steel tanks of approximately 1,000 gal. capacity. The first two of these are violently agitated to mix the incoming black ash, fresh water and steam. Virtually all leaching is accomplished in these tanks. The solution, with the undissolved matter, then passes on through the leaching system.

The first two tanks in the leaching system are brick-lined to help combat abrasion which is considerable; the other tanks are equipped with slow-moving agitators for decantation of the strong barium sulphide liquor from the insoluble residue. The concentrated solution contains about 15 percent BaS, has a specific gravity of 1.16 and is maintained at a temperature of about 80 deg. C. The decanted solution goes to storage for use in the manufacture of barium carbonate, while the thick slurry from the leaching system is pumped to storage for the manufacture of barium chloride.

Two types of barium carbonate are manufactured—"Free Flowing" and "Sulphur Free." Most industries can use these two types interchangeably, except where extremely low sulphur content is required, or where a mechanical feeding device is inadequate to feed the Sulphur Free material. The Sulphur Free material packs much more easily than the Free Flowing. Precipitation of both grades of carbonate is carried out in batches of approximately 10 tons.

In the manufacture of the Free Flowing grade of barium carbonate, one of two absorbing tanks is charged with the correct amount of barium sulphide liquor from storage. This liquor passes through a conventional cast-iron plate-and-frame press. After charging, flue gas from the boilers or scrubbed gas from the kiln is introduced through a series of header pipes into the base of the absorber.

Violent agitation and good absorption are secured by the use of high-speed, side-entering propeller-type agitators. Flue gas from the boilers contains about 11 percent CO_2, whereas gas from the kiln averages approximately 25 percent CO_2. Of the two, flue gas from the boilers is more dependable since its oxygen content is more easily controlled. Any appreciable amount of oxygen leads to the formation of undesirable oxidation products in the finished barium carbonate.

Gas is pumped into the solution at the rate of approximately 1,200 cfm., with a Nash pump, until the reaction is substantially complete. This reaction takes place in three steps, as shown by the following equations:

$$BaS + CO_2 \rightarrow BaCO_3 + H_2S$$

$$BaS + H_2S \rightarrow Ba(SH)_2$$

$$Ba(SH)_2 + CO_2 + H_2O \rightarrow BaCO_3 + 2\,H_2S$$

The first half of the barium carbonate is precipitated with virtually 100 percent absorption of the CO_2. As hydrogen sulphide starts being liberated from the sulphhydrate solution, the gas phase resistance greatly increases and absorption efficiency is lowered appreciably. During the second half of the precipitation, the hydrogen sulphide being liberated is contaminated with large quantities of nitrogen from the flue gas and small quantities of CO_2. Depending upon economic conditions prevailing, this gas is either burned with excess air and discarded, or it is scrubbed to remove the CO_2 and then further reacted with sodium sulphide to produce sodium sulphydrate.

Carbonated slurry, which still contains sufficient alkalinity to hold oxidation products in solution, is pumped to a decanting system where the liquor is sent to waste and the thickened slurry pumped to an Oliver filter. Wash water is added at this point until the cake shows no sulphide reaction with lead acetate. The cake then passes through a direct-fired dryer and the moisture content is reduced below 0.1 percent. It is then disintegrated with a Mikro-Pulverizer and goes to a storage bin for packing into bags, which is accomplished with a valve packer.

The Sulphur Free type of barium carbonate is precipitated by adding soda ash in dry form to hot barium sulphide solution. Addition is made until all barium sulphide has been precipitated and there is a minute trace of excess soda ash. This precipitation takes place according to the following equation:

$$BaS + Na_2CO_3 \rightarrow BaCO_3 + Na_2S$$

Thin slurry is boiled and pumped to a decanting system where the weak sodium sulphide solution is separated and goes to storage. The slurry is then passed over an Oliver filter for further thickening and a small amount of wash water is added. All wash liquors are incorporated with the decanting solution. The filter cake, which still contains a small amount of sodium sulphide, goes to a fresh water repulping tank and to another Oliver, where it is completely washed free from sulphides. Wash liquors go to waste, while the filter cake passes into a direct-fired dryer, then to a Mikro-Pulverizer and to the packer.

Free Flowing barium carbonate is made in steel equipment with the exception of pumps and pipelines. Corrosion is negligible in the absorbing tank, but it is so appreciable in the pumps and pipelines that Monel equipment has been adopted. To avoid iron contamination in the Sulphur Free material, all tanks have been brick-lined. Pumps, pipelines and fittings are of Monel. The primary Oliver filter for Sulphur Free barium carbonate is Monel fitted; the secondary Oliver is of steel.

Sodium sulphide liquor is fed from storage, after prolonged settling, into the evaporation system. Concentration is carried out in two stages. In the first, using steam at 100 psi., a concentration of 30 percent is reached. The second is accomplished using direct heat in gas-fired nickel-clad steel fusion pots. The final product contains 60 to 62 percent Na_2S and has a boiling point of about 183 deg. C. This solution is settled and pumped to a storage tank which feeds a conventional type Monel flaker. It is converted to flaked form and packed in steel drums for shipment.

MAKE BARIUM CHLORIDE

Thickened slurry from the leaching system, which is used in the production of barium chloride, consists of 20 deg. Be. barium sulphide solution and the water insoluble constituents from the kiln. These constituents include only a small amount of unconverted barium sulphate but considerable amounts of barium combined with iron, silica and aluminum. These last three compounds are virtually water insoluble, but they do react with hy-

drochloric acid to form barium chloride.

In the production of barium chloride the thickened slurry is pumped into a 5,000-gal. steel tank lined with brick and acidproof cement. Hydrochloric acid from another part of the plant is pumped in under slight pressure by a Duriron pump. Agitation is secured with a side-entering high-speed propeller-type agitator. Acid addition is made until a pH of about 5 is reached. Barium sulphide solution is then pumped in until the pH is above 7 and all ferrous iron has been precipitated. The solution is brought to a boil and passes on to a decanting system and an Oliver filter. The cake from the filter, which is washed substantially free of chloride, goes to waste and the decanted liquor and all washings go to storage. All pumps, pipe linings and fittings are either rubber-lined or constructed of Monel. All surfaces of the Oliver filter coming in contact with the liquor are of Monel. All tanks are brick-lined, using an acidproof cement.

From storage the barium chloride solution is pumped into batch-type evaporators which are equipped with Monel steam coils. The concentration is raised to approximately 32 deg. Be. and contains approximately 30 percent $BaCl_2.2H_2O$. At this point the solution is purified, converting all sulphur compounds to soluble barium sulphate. The hot solution is settled and goes to storage, from which it is pumped through a wooden plate-and-frame press to a batch-type vacuum crystallizer. The crystallizer is steel with a ceramic lining made of brick with low iron content and acidproof cement. Agitation is secured with multiple side-entering agitators, and the heating coil is of Monel.

More liquor is added at periodic intervals and evaporation is carried out under a vacuum. After sufficient concentration, the solution is cooled by means of the vacuum and the entire batch, of 7 to 8 tons, is pumped to a large Monel vacuum pan. The crystals are dewatered and washed free of adhering mother liquor with application of cold water.

After several hours of dewatering, the crystals are fed to a rotary dryer. A low-temperature flame or hot air is used to produce the crystalline-type material which contains two molecules of water of crystallization. This water of hydration can be removed by increasing the temperature in the dryer.

Moisture in this anhydrous product is reduced below 0.1 percent. The resulting material is extremely hygroscopic and is made only to fill orders, with no stock being maintained. Packaging is either in moistureproof bags with sewn and waxed closures or in steel drums. The crystalline material is packed in ordinary paper bags. Both the dryer and the revolving screen, which removes coarse particles, are of Monel.

Mother liquor from the vacuum pan and all washings are returned to the system until impurities reach a predetermined point. Periodically the entire system is emptied and evaporated to a very low point. Mother liquor from this batch of crystals is discarded; crystals are made up of fresh water to 30 percent concentration and reintroduced in the system.

BYPRODUCE SULPHIDES

In the first part of the barium chloride process, where the barium sulphide slurry is reacted with hydrochloric acid, very pure hydrogen sulphide is liberated. This gas is conducted into a steel absorbing tank wherein it reacts either with aqueous ammonia or sodium sulphide solution to form ammonium sulphide or sodium sulphhydrate respectively. The solution from the absorber, once the hydrogen sulphide content has been adjusted, is pumped to storage for packaging and shipping.

CHLORINATE BENZENE

The plant secures its hydrochloric acid for barium chloride by chlorination of benzene in a fairly conventional manner. Chlorination is done in steel equipment under semi-continuous conditions and is carried to a point of high dichlorobenzene content, using iron filings as a catalyst.

After chlorination, the mixed materials are neutralized with caustic soda and the sludge removed by decantation. The clarified mixture goes to a batch still which is equipped with a 35-ft. fractionating column packed with ¾-in. Raschig rings. The solution is separated under reflux conditions into benzene, monochlorobenzene and a mixture of orthodichlorobenzene and paradichlorobenzene. The benzene is returned for further chlorination.

Mixed dichlorobenzenes from the still are sent to a crystallizer where the temperature is reduced to 0 deg. C. This is done in small batches where approximately 400 lb. of paradichlorobenzene is crystallized out. The slurry passes to a batch-type iron centrifuge where the mother liquor is separated. Traces of orthodichlorobenzene are washed free from the cake at this point. The cake is then removed, melted and solidified. It is then ground on a gyratory crusher and classified to the usual commercial sizes.

Mother liquor from the centrifuge contains approximately 75 percent orthodichlorobenzene and 25 percent paradichlorobenzene. This is pumped to storage until sufficient volume is accumulated to charge a still. This mother liquor is distilled with a high reflux ratio taking off a fraction of orthodichlorobenzene and paradichlorobenzene rich in paradichlorobenzene. This process continues until the condensate finally has a melting point of −20-22 deg. C. At this point the column is run with total take-off and the condensate sent to storage for packing and shipping. This is technical-grade orthodichlorobenzene, containing about 15 percent paradichlorobenzene and traces of trichlorobenzene as impurities.

The company maintains a modern chemical control laboratory which makes tests from samples in all production. Constant sampling and testing have enabled the company to maintain control of purity and quality. The chemical laboratory also does research on new products and is engaged in plant refinement and improved processing.

SAVE THE SQUEAL

Since the plant develops its own byproducts for conversion, the amount of waste is too small to be economically recovered. Careful control is maintained on all waste to prevent air or stream pollution.

During World War II the company produced barium nitrate and barium chromate, and supplied barium carbonate to other producers of these items. These materials were used in the production of one type of incendiary bomb. Since the peacetime demands for barium nitrate and barium chromate are very limited, their production has been discontinued.

Water for the plant and the different processes is obtained from wells whose underground source is sufficiently near the surface to permit the use of horizontal centrifugal pumps of 300 gpm. capacity. The only water treatment used at the plant is for city water used for the boilers. Total water consumption runs between 400 and 500 gpm. Natural gas from the Louisiana fields is the only fuel used in the plant.

The objectives of the plant are ultimately, as funds become available, to achieve better diversification by manufacture of more products, to lower costs and to improve quality by process improvements, and to expand its technical staff and facilities.

Fred Lester is general manager of Chemical Products Corp. J. D. Clary is technical director and J. L. Gray is superintendent.



AT START OF TEST a 700 gal. solvent spill covers an 800 sq. ft. surface area. Watch the bucket vanish.



ONE AND ONE-HALF MINUTES later full strength foam is pouring from the marine nozzles near floor.

Foam Blankets Spilled Benzene

Hercules tests its new foam installation. Advantage over water-fog: prevents flammable vapors from reforming over blanket coating

C. L. JONES

It has been demonstrated that a protein base foam with an expansion of nine to ten is one of the best mediums for combating and controlling benzene fires. This same foam is effective on gasoline and furfural fires. In a test involving a surface area of 800 sq. ft. covered by 700 gal. of benzene, the fire was extinguished in less than three minutes. The foam blanket was so effective that it was not permeated by any appreciable volume of benzene vapors, as a large torch when passed over the top of the foam blanket failed to ignite the vapors.

At its naval stores plant at Brunswick, Ga., Hercules Powder Co. is using several flammable solvents that are capable of causing serious fires. Benzene is used to extract the various pine products from the wood and later must be evaporated and returned for re-use. Gasoline and furfural assist in the production of rosin. The volume of solvents in process in each of the buildings: extractor house, refinery and Pexite plant, is large, the greatest volume being in the first of these.

A modern and what seemed to be an adequate fire protection system had long been installed throughout the plant. But the company management feared that the existing protection might not be effective in event of a large spill of benzene or other solvent followed by fire. After all, water in any form, including "fog," while useful to combat solvent fires, is not a completely satisfactory extinguishing medium for such fires.

Mr. Jones is safety engineer with Hercules Powder Co., and a member of NFPA.

SOYBEAN BASE FOAM

A decision was made to devise a system of protection which would be quickly effective on a fire involving these solvents in any of the buildings, and that protection to be adequate to combat a fire involving all three floors of the extractor house, having a total floor area in excess of 35,000 sq. ft.

Extensive tests led to the conclusion regarding the protein base foam already mentioned. Tests were also carried out to determine the effectiveness of a foam blanket on a fire involving hot benzene.

It was found that even with the benzene at near its boiling temperature, when fired, the foam blanket was effective in extinguishing the fire. Furthermore, even with the steam heat remaining on the steam coil immersed in the benzene, there was no reignition of the vapors above the foam blanket when a large torch was passed over the top of the foam blanket.

A liquid foam solution instead of foam powder, or other foam producing mediums, was selected because of ease of operating the foam producing equipment and the simplicity of design. When using the liquid foam solution, one man, by operating a few switches, can quickly start up all of the equipment and arrange for the delivery of the foam solution to the desired points of use, where it is applied by fixed systems. By "quickly" is meant that foam can be discharging from all of the outlets comprising the fixed foam systems within about one minute from the commencement of a fire, requiring the application of foam from the fixed systems.

The design of protection finally adopted included fixed water-foam solution distribution systems somewhat comparable to "sprinkler" installations, in each of the three buildings. In the case of the extractor house, there is a total of six systems, each system being arranged to protect half of each of the three floors. Nearby is the benzene pump house which is similarly protected. Also, several large benzene storage tanks near the extractor house are similarly protected.

In each of the two other buildings a single system is installed. Here also, the nearby area on which the outside "work" or process tanks are located is foam protected.



THREE MINUTES after start of operations. Floor, with 6 in. concrete curbs, is nearly covered.



FOUR AND ONE-HALF MINUTES and end of test. Torch passed over foam ignites no new solvent vapors.

It was reasoned that if fires should occur, those of greatest magnitude and severity would probably be at the floor or ground levels; therefore, the protection should be applied at these points rather than by spraying the foam through the air from nozzles or other outlets located high above the area needing protection.

MECHANICAL FOAM SYSTEM

The marine nozzles (foam applicators) installed are placed so the discharge deflector plates are about 9 to 12 in. from the floor, or other surface protected. The piping distribution system which supplies the various marine nozzles is above head height with an air aspirator near the top of each such device. The marine nozzles are so placed that in case of need all areas of all floors can be covered with a foam blanket at least 6 in. deep within three minutes or less. In the case of the extractor house, this calls for a delivery of about 130,000 gal. of foam in that time. This is the largest load for any of the buildings.

The rate of foam application, about 1.20 gal. per sq. ft. per min., is in excess of the minimum requirements set by the Underwriters' Laboratories for the protection of tankage.

To supply the water-foam solution, the following equipment has been installed: three—2,200 gpm. centrifugal water pumps, which deliver water at a pressure of 140-160 psi. (These and all other pumps installed on this project conform with the Underwriters' standards for fire pumps.) Each of these pumps is driven by a 200 hp. electric motor. In addition, two of these pumps are fitted with auxiliary drives, these being gasoline engines.

The water from all three pumps is delivered to manifold from which individual underground steel pipelines supply the fixed foam systems in the various buildings, each such line being manually valved off at the manifold.

To inject foam solution into the suction of the three water pumps, two 400-gpm., 65 psi. centrifugal pumps are installed. The capacity of one of these two pumps is sufficient to supply the maximum quantity of foam solution required, and both are arranged to discharge foam solution into the suction line supply water to the three 2,200-gpm. pumps. One of these solution pumps is driven by an electric motor, the other by a gasoline engine.

The desired water-foam solution is about 6 percent, although it has been found by test that the foam made from a solution which varies somewhat from this concentration is practical and effective.

Proportioning of the foam solution is controlled by means of orifice plates which pass the required quantity of foam solution into the water suction line. For example, suppose one of the fixed systems calls for 600 gal. of a water foam solution. The foam solution pump will deliver, through an orifice in the solution pipeline, 36 gpm. of foam solution, into the pump suction line, while 564 gpm. of water is discharged by the 2,200 gpm. centrifugal pump.

The 2,200 gal. water-solution pump will discharge the 600 gal. of water-foam solution to the system calling for that amount, as the requirements of the particular system will call for approximately that quantity of foam solution. The excess over the 600 gpm. demand is discharged back into the suction side of the water-solution pump by means of a relief valve, to be recirculated.

The water-foam solution is delivered to the particular system needing foam. Near the top of each foam maker there is an air respirator. This automatically mixes air with the solution, which is delivered onto the burning surface.

To apply foam to any or all sections of the extractor house, the operator manually starts up one or all of the water pumps, and also one of the foam solution pumps. The water-solution valve supplying a particular fixed foam system and the corresponding foam solution valve are then opened (all of which are permanently labeled); then the foam will be automatically discharged from all of the marine nozzles or other applicator devices in that particular system. If every one of the six foam distribution systems in the extractor house is put into operation, all that is necessary is that the other five water-solution valves and the corresponding five foam solution valves be opened.

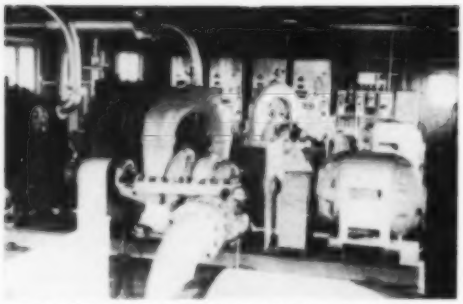
STABILITY IS HIGH

A sufficient quantity of foam solution is provided to supply the maximum load for a considerable period of time. This foam solution is stored in a 10,000-gal. above-ground, covered and insulated steel tank.

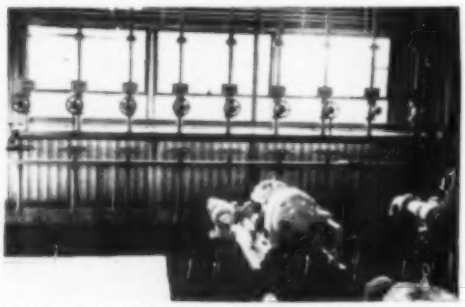
Stability of the selected foam solution is exceptionally good. There are records of such foam solution remaining sweet for many years, even under adverse storage conditions.

The quantity of water immediately available for supplying the pumps is approximately 400,000 gal. This water is stored in an above-ground steel tank located near the pump house. The water flow (from wells) into this tank is of the order of 15,000-18,000 gpm.

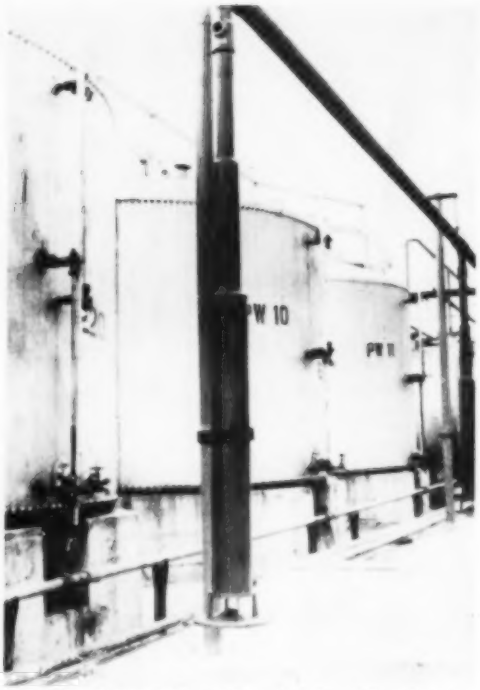
To augment the supply of water



CENTRIFUGAL WATER PUMPS, driven by electric motors and gasoline engines supply water-foam solution.



CONTROL VALVES for the individual systems are located in pump house. One man operates all.



MARINE NOZZLES 9 to 12 in. from floor deliver foam to burning surface. Piping is above head height.

Here's the equipment in Hercules' foam fire-protection system

for the yard hydrants throughout the entire plant, and for all installed sprinkler systems, a cross-connection has been made from the discharge header of the three 2,200-gpm. pumps to the underground fire system. Thus, in case of need, a large added volume can be pumped into the underground fire protection system, providing a total pumping capacity of about 10,000 gpm., available for fire fighting purposes.

In addition to the fixed foam protection, first-aid foam hose streams have been provided in the various buildings for combating small fires if any such should occur. There are 12 first-aid stations in the extractor house, 4 in the refinery, 4 in the Pexite plant, and 4 in the yard area between extractor house and refinery.

In order to build up the required depth of foam blanket on the various floors, concrete curbs at least 6 in. high have been installed around the building perimeter on all floors. Similar curbs have been installed around all floor openings, so that each floor level or other surface protected is in effect a pan at least 6 in. deep. Thus, if a liquid spill should occur, it is retained within that pan, and when foam is applied, it builds up on top of that liquid surface. These curbs have also been placed around the protected tankage area which is near the buildings.

All foam protected buildings are also protected by sprinkler systems, and in case of fire, water could be discharged from many sprinkler heads. It was at first thought that this sprinkler water discharging onto the foam blanket would quickly damage it, and some consideration was given to the idea of shutting off the sprinkler systems. But, before reaching that decision, tests were made to determine if the foam blanket would be quickly damaged by sprinkler discharge.

It was found that the foam blanket was not seriously damaged by water flow from sprinkler heads for a number of minutes; therefore, the decision was reached to leave the sprinkler systems "on" in all buildings. The water discharge from the sprinkler heads will serve to cool structural members and equipment, and in so doing will effectively aid in combating fire, and without seriously damaging the foam blanket on the floors.

Several persons assisted the writer in the preparation of the design of the fire protection facilities described. Of these, the following men are deemed worthy of special thanks for their efforts and contributions: L. W. Boerner, chief engineer of the National Foam Systems, Inc.; C. B. Miller, vice president of Automatic Sprinkler Corp. of America; H. N. Rider, manager of technical division of the same firm; and E. B. Rumble, manager of fire-fog department of that firm; J. A. McGarry, project engineer of the engineering department of Hercules; and M. S. Byers, general safety supervisor, Hercules Powder Co. All of these men contributed a great deal to the creation of a new kind of fire protection for solvent processes, the completion of the installations, and the final testing of the systems.

Labor Cost of Installing Piping

Labor Cost of Installing Piping
(Handling, Welding, Installing)

Size No.	Nominal Dia., In.	Weight Per Ft., Lb.	Percent Wt. Increase	Investigated Cost Per Ft.	Calculated Cost Per Ft.
0	3.0	7.57	....	$0.33	$0.34
½	3.5	9.11	1.20	....	....
1	4.0	10.79	1.20	0.40	0.41
1½	5.0	14.62	1.35	....	....
2	6.0	18.97	1.29	0.51	0.51
3	8.0	28.55	1.50	0.64	0.62
4	10.0	40.48	1.43	0.79	0.75
5	12.0	49.60	1.23	1.00	0.92
6	14.0	55.00	1.11	1.28	1.12
7	16.0	63.00	1.14	1.54	1.37
8	18.0	71.00	1.12	1.82	1.67
9	20.0	79.00	1.11	2.08	2.04
10	22.0	87.00	1.10	....	....
11	24.0	95.00	1.09	3.05	3.03
	Arithmetic average		1.22	..	...

Last two columns of table show that author's formula makes close predictions

R. A. DICKSON

There is a reason why accurate piping costs are practically never available to the estimating division of the engineering department in a large process industry company. It is because such costs do not reach the accounting department, and that is where estimators go to refer to cost records. This is not to say what costs are not collected in the accounting department. They are, in the form of charges against mechanical orders, special memos, appropriations, etc., but these charges do not always accurately reflect field costs.

The reasons for this are two. First, inaccurate returns from the field. Never does a pipefitter gang have a timekeeper with it all day, every day. Between visits of this functionary the gang may have worked on several jobs; the time spent on these jobs might all be charged to the one job number the foreman remembers, and so reported to the timekeeper. Second, there is a department between the field and accounting whose function is to see that appropriations are not overrun. Common practice is to switch charges from poor to rich appropriations and quite frequently it is a pipeline that is padded or robbed. For these and other reasons that may occur to those familiar with process industry organizations and their habits, final reports to the accounting department are not to be taken too seriously.

Every estimating division should have its own justifiable norm of piping labor costs for reference in case of disputes over whether a pipeline is costing too much, or whether the estimate is low. With such a norm the pipefitters can be asked to explain why, and steps can be taken to correct any conditions thus uncovered which are tending to increase labor costs.

Since welded joints are the most popular today, this article is concerned with pipe strings made up with welded joints, and standard weight steel pipe, in all of the examples given.

Piping labor costs include double handling, for reasons which will be explained later—welding the welded joints, and bolting the flanged joints.

The welding foreman should have a good idea how long it takes how many men to weld joints in any size pipe he is accustomed to handle. Therefore welding costs obtained from the welding department should be considered justified. Bolting up flanged joints has long been estimated to cost $1 per inch of nominal pipe diameter. This is a "finagling factor," but it is a very small percentage of the total labor cost.

REASONS FOR DOUBLE HANDLING

Now for the reason that the pipe gets double handling: Owing to explosion hazards in a great many process industries, there are large areas within the plants where welding is forbidden. A common custom is to weld, on the ground, outside a forbidden area, a string of five 20 ft. lengths with weld-neck flanges at each end of the 100 ft. strings. These are then moved to their final positions in the pipeline being installed and the end flanges are bolted up. The pipe is handled once from stockpile to welding station, then to final position in the line. Large sizes, probably from 3 in. dia. on up are now handled by Ross carriers and some kind of crane, truck, tractor or locomotive crane.

Investigation has shown that the average percentage increase in weight per foot of carbon steel pipe, Schedule 40 from 3 in. to 10 in. and 0.375 in. wall from 12 in. to 24 in. is 1.22 from size to size, that the average percentage increase in labor cost from size to size between 3 in. and 24 in. is 1.22, and that labor costs calculated by the formula $y = aK^x$ run very nearly equal to what might be called investigated costs of the same pipe size series. In the table compare the last two columns.

SAMPLE PROBLEM

Here is an example. Find the labor cost per foot of 24 in. seamless steel pipe with 0.375 in. wall, joined into a string with welded joints. The investigated cost is $3.05 per ft. The investigated cost of 3 in. pipe is $0.34 per ft.

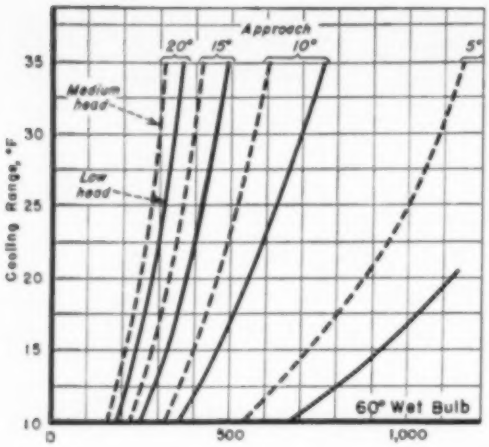
To avoid negative characteristics the unit of pipe length is taken at 100 ft. Then from the formula, taking logarithms of both sides, $\log_a y = \log_a a + x\ (\log_a K)$ where y is the labor cost of any desired size, say 24 in.; a is the known labor cost of a size taken as a base (3 in. is used in these calculations); K is the percentage increase in labor cost from size to size; and x is the size number, see the first column of the table. Then: $\log_a y = \log_a 34 + 11\ (\log_a 1.22)$. Solving this, y equals $303 per 100 ft. or $3.03 per ft.

This exposition and the accompanying table are to be taken as a demonstration of a method, not as a table of labor costs to be put into general use in all plants.

Due to the many variables among plants in the Process Industries such as lack of uniformity in the make-up of pipefitter gangs, the quality of their supervision, the extent to which the departments are mechanized and the general layout of the plant itself, costs in one plant may be way out of line with costs in another.

Estimating divisions interested in this method of getting up their piping labor costs should determine their own basic quantities to be used in the formula.

R. A. Dickson is an engineer who lives in Caldwell, N. J. He is co-author of a forthcoming book on piping practice and costs.

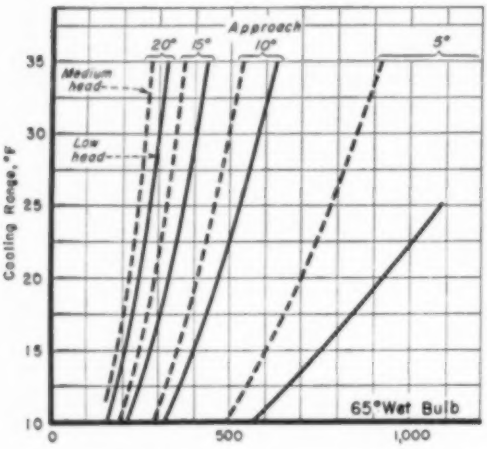


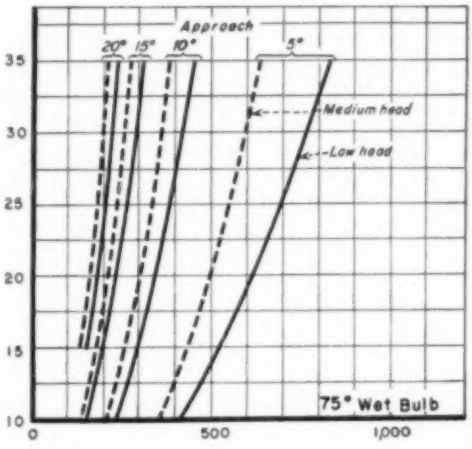
SAMPLE PROBLEM. How much ground area, fan power, pumping power and make-up water are required for a medium head, induced draft cooling tower that will cool 11,000 gpm. from 85 deg. F. to 70 deg. at a wet bulb temperature of 60 deg.?

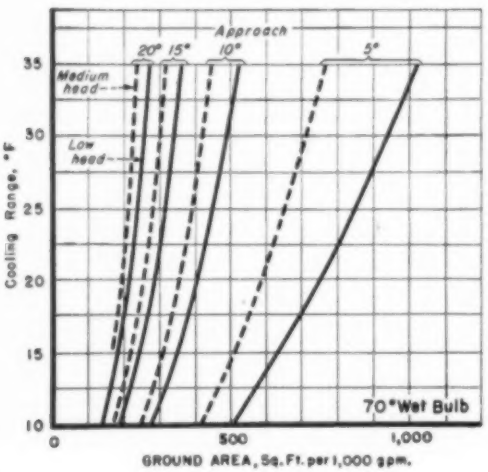
SOLUTION. This is intended only to show the simplicity of the mathematics, all of which is here. Explanations are in the text.

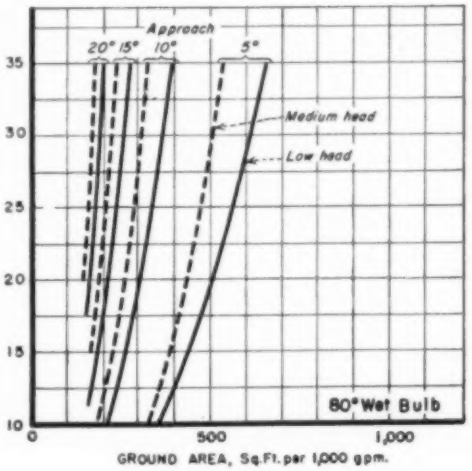
Ground area .....11×400* = 4,400 sq. ft.
Fan power .....11×12† = 132 hp.
Pump power .....11×85† = 9.4 hp.
Make-up
11,000×(0.2%†+15×0.1%†) = 187 gpm.

*Directly from chart for 60 deg. wet bulb. † Factor developed by the author, explained in text.









What Size Cooling Towers?

Charts and factors answer questions of size, make-up water and power requirements, and performance at other than design conditions. Accuracy is adequate for preliminary estimates.

E. L. PFEIFFER

Many engineers are familiar with the theory, function and operation of cooling towers, yet it is believed only a minority may have sufficient information from which to make an approximate selection of the required tower size, to estimate its operating costs or to predict its performance at conditions other than the design. On the other hand, present day engineering requires consideration of these facts when new plant installations or additions to existing facilities are contemplated.

An approximate method of cooling tower selection and performance analysis of sufficient accuracy to satisfy preliminary requirements has been used by the author for a considerable time with satisfactory results. At the suggestion of others who have found it helpful, the method is presented.

The method is particularly adaptable to the universally accepted, mechanical draft, counter-flow cooling tower, wherein the downward falling drops of water cascade over and are momentarily delayed as they strike each of a series of decks, while at the same time being brought into contact with the upward flowing air stream.

In a preliminary study of cooling towers or other equipment, it is not important to determine exact figures because alterations and changes in the course of the study are often so numerous that detailed selections or estimates would be useless and all but the final selection would be discarded, anyway. It is, however, not only desirable but necessary to arrive at an "order of magnitude" idea, say within 10 to 20 percent of what is involved. It is important that size be known in order to locate the tower. It is of value to determine power requirements in order to include them in the total plant load. The pumping head should be selected in accordance with the design of existing circulating pump characteristics or in the case of new installations including pumps, the head can be selected on the basis of evaluated power costs.

Planning should further develop the most economical sizes of related and interconnecting units. When cooling towers are employed in conjunction with other heat exchange units such as shell and tube exchangers or condensers, a comparison of related sizes will indicate the most economical combination. For example, regardless of whether the initial plan calls for a large condenser surface served by a small tower, or the reverse situation wherein a large tower and a small condenser are selected—a study, comprising a number of combinations will indicate the optimum economical selection which best satisfies the particular requirements.

In the selection of a cooling tower there are a number of factors to be considered; however, once the heat load has been established, the wet bulb and the approach to this wet bulb are the controlling factors in its design. The term "approach" refers to the difference between the required cold water temperature, and the design wet bulb temperature. The smaller this temperature difference, for given requirements, the larger the tower. In order to keep the tower size and cost to a minimum the design wet bulb temperature and the cold water temperature should, therefore, have as great a differential as operating conditions will permit.

The design wet bulb temperature should be selected on economical considerations and will not necessarily be the highest wet bulb temperature registered in the area. This would result in a tower entirely too large and costly for normal conditions. The economical wet bulb selection usually is one that is exceeded for two to three hundred annual operating hours. As the periods when the actual wet bulb temperature exceeds the design wet bulb temperature are for short duration during summer midday hours it is more economical to operate at slightly higher water temperatures from the tower during these hours than to install a tower that would be oversize for all but these short periods.

For example, a designer was requested to select a tower to supply cold water at a temperature of 80 deg. F. with a 75 deg. F. wet bulb. Investigation of U. S. Weather Bureau Reports for the particular area disclosed the 75 deg. temperature was reached or exceeded for only four hours annually. (U. S. Weather Bureau Reports are available at any of the Weather Bureau Stations located throughout the country.) Further examination of these data revealed that a 72 deg. wet bulb temperature was equalled or exceeded only 230 hours during the year. The designer recommended the tower be selected for the 72 deg. wet bulb temperature. The result was a 20 percent reduction in first cost and a 20 percent reduction in annual operating costs since the design approach was increased from 5 deg. to 8 deg. During the 230 hours annually in which the 72 deg. wet bulb was exceeded the cold water temperature increased over the 80 deg. approximately 1 deg. for each degree of wet bulb increase but the prospective purchaser was satisfied that the savings in tower cost and operation more than justified his process losses for these periods. It was not desirable in this instance to select a lower wet bulb, say 70 degree, since this temperature was exceeded by too great a number of hours.

Preliminary to outlining examples of the application of the data, it is proper to point out that any approximate method is based on an average of specific cases, the larger the number, the greater the average accuracy. Selections from which these data were prepared utilized air flow rates from 1,300 to 1,500 lb. per hr. per sq. ft. of ground area. Curves shown cover five common wet bulb temperature conditions, namely, 60, 65, 70, 75 and 80 deg. The ordinates refer to tower cooling range and the abscissas indicate ground area requirements. The approach lines are in 5-deg. incre-

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ments between 5 and 20 deg. Ground area requirements for towers with low pumping heads are identified by the solid curve lines. Medium pumping heads are represented by the broken lines. For preliminary purposes, low heads for induced draft towers may be considered as those between 21 ft. to 24 ft. while medium heads are from 25 ft. to 28 ft. These heads will be 2-ft. lower in forced draft towers.

Assuming a circulating pump efficiency of 85 percent and neglecting the driving equipment losses, the average pumping power requirements for the low head tower can be assumed to be 7 hp., and for the medium head 8.5 hp. per 1,000 gpm. circulated.

Fan horsepower requirements are influenced by a number of factors such as the fan diameter, its operating speed and its efficiency. In the forced draft tower they are about 10 percent less than in the induced, since part of the fan velocity head is converted to pressure by proper fan house design. In the induced draft tower the entire fan velocity head is utilized in discharging the exhaust vapors into the atmosphere. Usually the most influential factors affecting the fan power are the approach and cooling range. Bearing in mind the numerous influences upon fan power, it was felt that an average of a large number of installations would be the most acceptable. For the low head tower a figure of 14 fan hp. per 1,000 gpm. circulated is representative. In the medium head tower 12 fan hp. per 1,000 gpm. circulated will do. Simply and without lengthy theoretical comment, it may be explained that within limits increased packing heights permit proportionate reduction of air quantities without affecting the overall tower performance.

One additional factor of importance is the tower make-up water requirement. The amount required for windage and drift losses is normally not in excess of 0.1 percent of the total circulation ;however, under certain conditions, it may occasionally be as high as 0.2 percent. The amount necessary to replace that lost by evaporative cooling in the tower will vary with each particular installation. For practical purposes the total amount of water circulated multiplied by 0.1 percent of the cooling range will give evaporating make-up requirements.

Examples of uses of the data follow:

1. *Wanted*—An induced draft tower to cool 5,000 gpm from 100 deg. F. to 80 deg. F. at a 70 deg. F. wet bulb. Give space requirements, fan and pumping power requirements as well as make-up. For comparison show (a) low and (b) medium head towers.

Answer (a) — The cooling range from 100 deg. F. to 80 deg. F. is 20 deg. F. The approach from 80 deg. F. cold water to the 70 deg. F. wet bulb is 10 deg. F. On the 70 deg. wet bulb curve find the intersection of the 10 deg. F. approach with the 20 deg. F. range. At this intersection read 400 sq. ft. of ground area required for each 1,000 gpm. in the low head tower or a total of 2,000 sq. ft.

Fan power is 5 x 14 = 70 hp.

Pump power is 5 x 7 = 35 hp.

Make-up = 10 gpm. drift (assume 0.2 percent max. loss). 100 gpm. evaporation loss = 110 gpm.

Answer (b)—for a medium head tower the figures would be:

Area = 1,780 ft.

Fan power = 60 hp.

Pump power = 42.5 hp.

Total make-up (same) = 110 gpm.

2. *Wanted*—Complete data on low and medium head induced draft towers to cool 40,000 gpm. from 105 to 89 deg. F. at a 75 deg. F. wet bulb.

Answer—Interpolate for the 14 deg. F. approach.

Low head—Area 40 x 230 = 9,200 sq. ft.

Fans 40 x 14 = 560 hp.

Pump 40 x 7 = 280 hp.

Make-up (0.2 percent + 1.6 percent) × 40,000 = 720 gpm.

Medium head—Area = 8,800 sq. ft.

Fans = 480 hp.

Pump = 340 hp.

Make-up = 720 gpm.

3. *Wanted*—The approximate area of a low head tower to cool 10,000 gpm from 97 deg. F. to 87 deg. F. at a 77 deg. F. wet bulb.

Answer—Refer to both 75 deg. wet bulb and 80 deg. wet bulb curves. On the 75 deg. curve the 10 deg. approach intersects the 10 deg. range at 240 sq. ft. per 1,000 gpm, while on the 80 deg. curve the intersection is at 210 sq. ft. Interpolation gives 228 or 2,280 sq. ft. required for 10,000 gpm.

Another application of these curves is in the approximate prediction of tower performance. Procedure is merely reversed. Knowing tower size and design conditions are all that is necessary.

4. *Wanted*—Performance of low head tower selected in Example 1 (above) indicating expected cold water temperatures from the tower at 60 deg. F. and 65 deg. F. wet bulbs, all other conditions remaining the same, namely 5,000 gpm. and 20 deg. F. cooling range.

Answer—On the 60 deg. F. wet bulb curve the intersection of the 20 deg. F. range line with the 400 sq. ft. line indicates an approach of approximately 14.5 deg. or an expected cold water temperature of 74.5 deg. F. at a 60 deg. F. wet bulb. At a 65 deg. F. wet bulb the same procedure indicates an approach of 12 deg. F. or expected cold water of 77 deg. F.

5. *Wanted*—Performance of low head tower of Example 1, when the heat load is increased so that the cooling range is now 25 deg. F. instead of the design 20 deg. F. Water loading remains at design of 5,000 gpm. Give expected cold water temperatures for 60 deg. F., 65 deg. F. and 70 deg. F. wet bulb temperatures.

Answer—Refer to the 60 deg. F. wet bulb curve, find the intersection of the 25 deg. F. range with 400 sq. ft. at an approximate approach of 16 deg. F. on the 65 deg. F. wet bulb curve at 14 and on the 70 deg. F. curve at 12. Performance at the 25 deg. F. range is as follows:

60 deg. F. wet bulb + 16 deg. F. approach = 76 deg. F. cold water

65 deg. F. wet bulbs + 14 deg. F. approach = 79 deg. F. cold water.

70 deg. F. wet bulb + 12 deg. F. approach = 82 deg. F. cold water.

6. *Wanted*—Performance of the above tower at the original 70 deg F. wet bulb temperature but with reduced water flow to 4,000 gpm instead of design 5,000 gpm. With the cooling range remaining at 20 deg what will new outlet and inlet temperatures be?

Answer—Percentagewise there is now available 500 sq. ft. per 1,000 gpm. On the 70 deg F. wet bulb curve the approximate approach indicated by the intersection of the 20 deg. F. range and 500 sq. ft. is 8.6 deg. so that the expected cold water temperature is 78.6 deg F. with the hot water temperature reduced accordingly to 98.6 deg. F.

It was intended to include cost data of a general nature herewith, but due to variations in labor, material and other costs throughout the country any such tabulation would be outdated by the time this article reached the reader. It was, therefore, decided to prepare approximate cost information which may periodically be brought up to date.

In conclusion, it should be understood that cooling tower design and selection are not limited to the data included, which covers only the more general requirements. Further, actual final design selections by the manufacturer may differ considerably from the preliminary selection. In the final design every phase must be considered and though the manufacturer may offer a standard cell size, this is only done after a careful study has been made to determine the best engineering and most economical selection.

Pacific Power Prospects

An outline of the present and an analysis of the trends affecting the Pacific process industries

JOHN R. CALLAHAM

Processing firms that plan to begin plant operations in the West usually ask two questions: What is the real power situation there now? What are the prospects for the future?

It is not always easy to get the answers. The situation and prospects vary from region to region and for different reasons. Behind all the answers there lies a maze of closely-knit factors that have little to do with process engineering.

Right at the outset, here is our summary: (1) outside of the Pacific Northwest, the power outlook in the West is now favorable—although the localized picture may still be a bit spotty; (2) the trend is toward higher rates—and 2-mill power may become a thing of the past; (3) but the West will keep its relative position in the nation as an area of cheap electric energy.

STATUS QUO AND WHY

Waterpower has contributed much toward the low rates for electric energy that generally prevail in the West; fuels have been used largely to supplement hydro output. For example: in 1946 hydro plants supplied over 85 percent of the West Coast electric energy output; for the nation as a whole they supplied 20-25 percent of the output.

But why, from 1945 to late 1948, did most of the area's electric utility industries show a shrinking margin of generating capacity over load requirements? Local variations on the familiar themes were the cause: (1) rapid population growth—as high as 45 percent—since 1940; (2) a general expansion and diversification of industry; (3) greater mechanization of farm and factory operations; (4) inability to expand generating facilities during the war and delays caused by equipment shortages after the war; (5) the unexpected postwar demand of the aluminum industry for large blocks of power that would have been available for other uses; (6) very low rainfall in some regions.

As a result, most of the area has experienced, or is experiencing, a cutback in service. This usually hits the chemical process industries earlier and harder than most others.

Northern California had a real emergency last spring. It was caused by all the factors mentioned, but largely by low rainfall that cut generating capacity and at the same time skyrocketed the demand from agriculture for pumping. Three chemical plants in the Bay area using low-rate interruptible power were cut back for several months to about 50 percent of normal operations.

But the situation has now changed and the process industries can plan again for the future. Pacific Gas & Electric Co. is progressing with its expansion program—the biggest of any electrical utility in America—that will add 1,343,000 kw. in generating capacity to northern and central California by the end of 1951. Only 26 percent of the new capacity will be hydro.

The chemical and allied industries of northern California (with 249 plants of all sizes) still do not figure heavily in the area's power economy. Yet 30 of these plants use a total of 56,000 kw. or about 4.75 percent of the energy sold by Pacific Gas & Electric Co. Annual power use load factor of this group is close to 78 percent.

Southern California had a larger margin of steam plant capacity and has not felt a general power pinch. During the past year the southern California-Nevada-Arizona area had the widest margin between capacity and load, although peaks in eastern Arizona have recently topped rated capacity.

For southern California and the Southwest as a region, the mid-1948 installed capacity was 4,900,000 kw. and the peak load was 4,701,000 kw. Henderson in southern Nevada seems to be one of the very few places where blocks of cheap (3-mill) power may be available; this is being contracted for by several chemical firms. Plans are under way to get more energy to supply Henderson's future processing plants.

California's fuel-based electric energy in 1947 (a year of deficient water power) rose to nearly 45 percent of the total output. Of new capacity scheduled for the three-state area in the period 1948-1953, almost 60 percent will be from fuel plants. The proportion from new fuel plants in southern California runs close to 75 percent. Within the next 20 years, fuel-based energy in California may exceed that from hydro.

On the other hand, a large volume of hydro power will most likely be developed from multiple-purpose projects. Seven of these now being considered for California and the Colorado River would have an initial capacity of 1,700,000 kw.—about 30 percent of the present capacity in the California-Arizona-Nevada area.

Here, then, is how we see the trends in California and the Southwest: (1) except for localized areas, the power shortage is over even though the margin is slim; (2) by 1951 or sooner, new capacity will make electric energy plentiful again; (3) more of the new facilities will use fuel, which means a trend toward higher rates; (4) most of the large new hydro plants will be federal multiple-purpose projects that will require much time and money (here's where the 81st Congress comes in).

UP IN THE NORTHWEST

The Pacific Northwest has been looked upon as an area of plentiful power. This does not hold now. Actually, the Pacific Northwest has a "medium-term" problem more acute than any other large western area even though it has a huge undeveloped hydro potential. Whether this "medium-term" problem stretches out into a "long-term" one will depend largely on how fast the federal power projects are pushed and new ones started. Even if approved federal projects are finished as fast as possible, generating capacity will not catch up with needs until about 1954.

Already, plans for large new electrochemical and metallurgical plants

(*Continued on page 107*)

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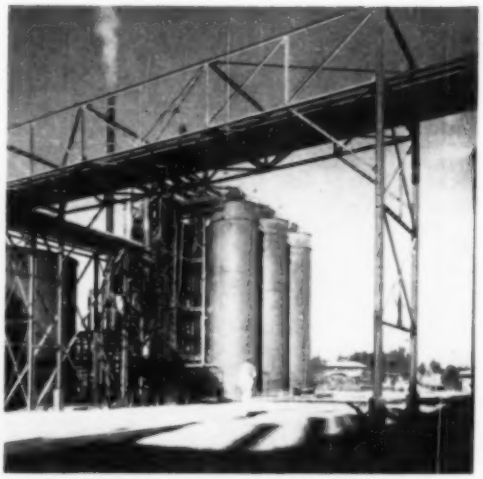


NEW EXTENSION on AP&C plant at Searles Lake. It is a complete, new sodium carbonate unit—five million dollars worth.

Plant Expansion at Trona Soda Ash and Borax



PIPELINE across dry bed of Searles Lake carries brine (6 percent Na_2CO_3, 1.8 $Na_2B_4O_7$) from wells to plant's . . .



. . . CARBONATORS. Here CO_2 converts carbonate to bicarb, which precipitates. Thence to Dorr thickeners and . . .



Photos below show main process steps.

Boosts Capacity

New American Potash unit taps recently found brine. Will produce 60,000 tons of sodium carbonate annually.

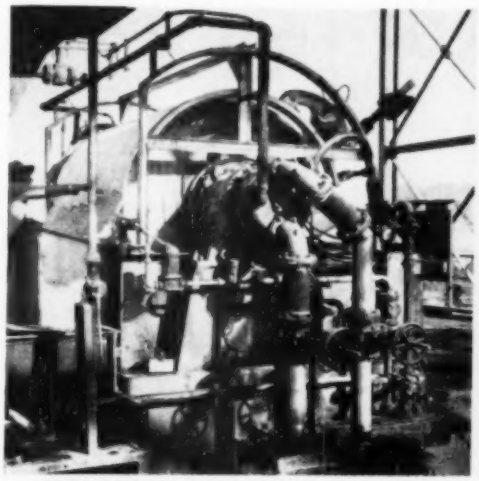
American Potash and Chemical Co. has started to operate its new sodium carbonate unit at Searles Lake. It will add 60,000 tons of soda ash and 30,000 tons of borax to the annual output of the Trona, Calif., plant—and bring to 790,000 tons the yearly crop of commercial chemicals harvested by AP&C from the desert. Except for power house, the extension is an entire soda ash plant, complete and new from brine wells to bagging. The aerial photograph on the left shows all $5,000,000 worth of it, with only the lake system missing.

At the extreme left are the carbonators. They process brine pumped in from the lake system at 800 gpm. Brine, containing about 6 percent sodium carbonate and 1.8 percent borax, comes from eight wells drilled into a recently discovered brine deposit at a lower level beneath the dry surface of the lake. It is delivered to the plant by 3,000 ft. of 12-in. concrete-lined steel pipe above ground and 14,000 ft. of transite pipe under the surface. In the carbonators brine reacts with CO_2 contained in flue gas and gas from the bicarbonate calciner; sodium bicarbonate precipitates. The slurry is concentrated in Dorr thickeners (barely discernable in air view through framework of unfinished building, and pumped to Oliver filters. One filter is plainly visible in the near corner of the building's second floor. Dewatered $NaHCO_3$ drops down to the first of the four big kilns in the foreground. This is the bicarb dryer. Second in line with it is the calciner, an 80-ton unit 80 ft. long and 8 ft. dia.; it drives off CO_2 at about 750 deg. F. (note that it is inclosed for insulation). Finally, ash passes through the third-in-line, the bleacher, and doubles back through the monohydrate dryer. The covered belt conveyor carries dry, dense soda ash out to the screening, storage and bagging equipment at the extreme right edge of the picture.

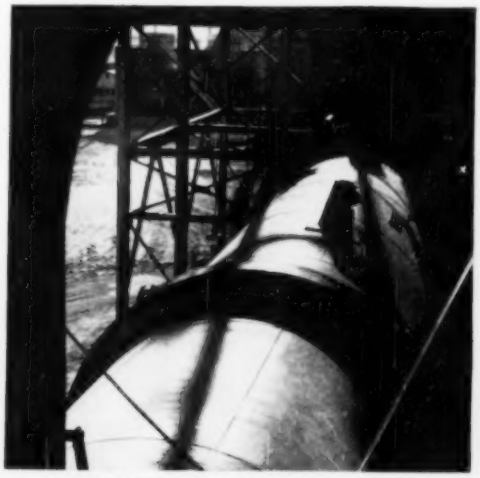
Byproduct borax is recovered from filtrate by crystallizing, thickening and filtering; filter cake is repulped and sent to the company's borax plant.

CONSTRUCTION TRICK

To get the 60 to 80 ton kiln dryers up on their mounts, the plant erectors (Fluor Corp., Los Angeles) borrowed a trick from the pyramid building pharaohs. They poured the foundations and placed the dryer supports on top, 15 or 20 ft. in the air. Then they bulldozed earth up around the foundations and laid a spur track on the fill. The dryers could then be rolled up the track and eased off onto their supports. Removal of the fill left them high and dry, as they appear in the air view.



. . . OLIVER FILTER, where bicarb is dewatered. Four huge dryers (foreground, air view) finish job; first is . . .



. . . BICARB DRYER. It is followed by calciner (reconverts bicarb to carbonate), bleacher and monohydrate dryer.

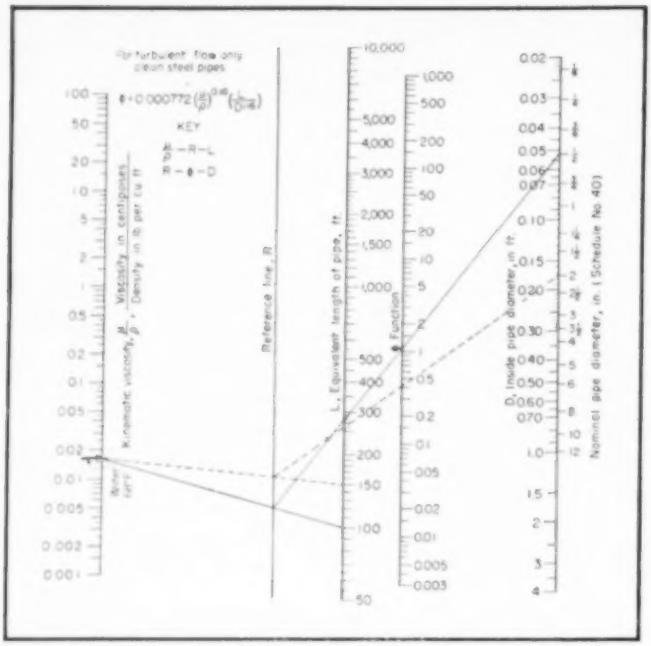


Fig. 2—This chart gives factor θ from constants of each installation, for use in determining discharge rate or time by Figs. 3 or 4.

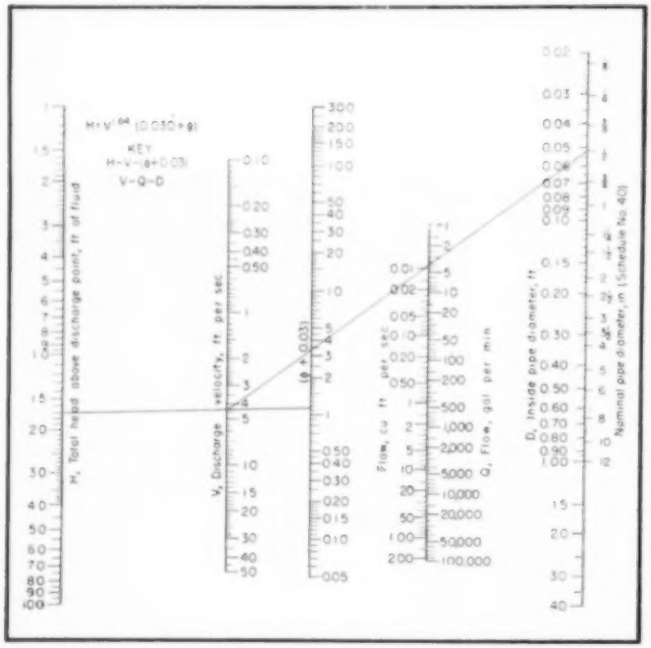


Fig. 3—Knowing factor θ and discharge rate, this chart gives discharge velocity and required total head of liquid.

Nomographs Speed Flow Calculation

Three charts are presented to facilitate determining flow rate or time of discharge from a tank through a pipe

JOHN F. HEISS and JAMES COULL

When a piping system operated under a constant positive head is to be used, it is often necessary to estimate the head required to give a definite rate of flow. Or, conversely, if the system is to be designed with the head and equivalent length of pipe known, the diameter of the pipe chosen must be selected so that the required discharge rate is obtained.

Ordinarily, trial-and-error methods must be used in calculating discharge rates at constant and receding heads. By means of an equation developed by Genereaux[1], in which he expressed the friction factor as a function of the Reynolds number (for Newtonian fluids) in commercial pipes, it is possible to arrive at a rapid method for calculating the desired unknowns. In addition to the friction loss through the equivalent length of pipe, the contraction loss and velocity head are also considered.

Case I—With a constant positive head in the tank at all times, the problem is to determine discharge through L equivalent feet of pipe. The situation is diagrammed in Fig. 1.

The following equation for the system shown is derived from Bernoulli's theorem, with the restrictions in this case that: (1) no booster pump is used; and (2) the tank is sufficiently large

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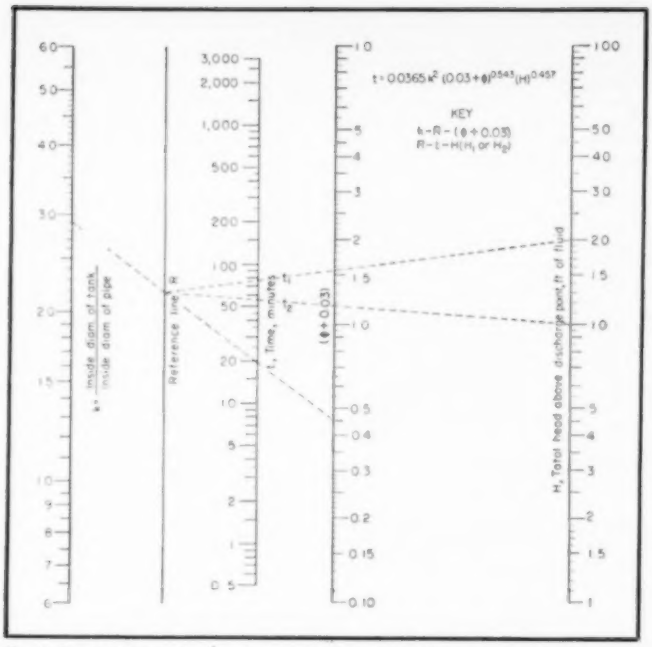


Fig. 4—Knowing factor ϕ and tank size this chart gives discharge time for liquid to drop from any level to a lower level.

Nomenclature

- A = Cross sectional area, sq. ft.
- C = Coefficient of discharge, dimensionless.
- C' = Roughness coefficient, dimensionless.
- D = Inside diameter, ft.
- F = Friction loss, ft. of fluid.
- f = Friction factor, dimensionless.
- g = Acceleration of gravity, 32.2 ft./sec.^{2}
- H = Algebraic sum of potential and pressure heads, ft. of fluid.
- k = Ratio of tank to pipe diameter.
- L = Equivalent length of straight pipe, ft.
- p = Static pressure, lb./sq. ft.
- q = Volumetric flow rate, cu. ft./sec.
- t = Time, sec.
- u = Local velocity, ft./sec.
- v = Specific volume, cu. ft./lb.
- V = Average linear velocity, ft./sec.
- Z = Potential head of liquid, ft.
- μ = Viscosity, lb./ft. x sec.
- ρ = Density, lb./cu. ft.

Subscripts

- 1 = Inlet or upstream position.
- 2 = Outlet or downstream position.
- c = Refers to contraction.
- o = Refers to orifice.
- p = Refers to pipe.
- t = Refers to tank.

so that the term $u_1^2/2g$ is negligible. Then:

$$Z_1 - \int_1^2 v\,dp = Z_2 + \frac{u_2^2}{2g} + \Sigma F \qquad (1)$$

Considering a liquid as incompressible,

$$Z_1 - v(p_2 - p_1) = Z_2 + \frac{u_2^2}{2g} + \Sigma F \qquad (2)$$

Defining the algebraic sum of the potential and pressure heads as H, then

$$H = \frac{u_2^2}{2g} + \Sigma F \qquad (3)$$

In the figure shown,

$$\Sigma F = F_p + F_c \qquad (4)$$

Assuming that the ratio of pipe diameter to tank diameter is very small,

$$F_c = 0.5\,\frac{u_2^2}{2g} \qquad (5)$$

From the Fanning equation,

$$F_p = \frac{2fLV^2}{gD} \qquad (6)$$

Substituting Equations (4), (5) and (6) into Equation (3) yields

$$H = 1.5\,\frac{u_2^2}{2g} + \frac{2fLV^2}{gD} \qquad (7)$$

For practical purposes, with an incompressible fluid, $u_2 = V$, so that

$$H = \frac{1.5\,V^2}{2g} + \frac{2fLV^2}{gD} \qquad (8)$$

For turbulent flow, Genereaux[1] has developed the following empirical relationship which gives safe design values of friction factor f for commercial pipes where the Reynolds numbers vary from 2,000 to 20,000,000:

$$f = 0.04\,N_{Re}^{-0.16} \qquad (9)$$

Substitution of Equation (9) into Equation (8) gives

$$H = \frac{1.5\,V^2}{2g} + \left(\frac{0.08\,L}{g}\right) \times \left(\frac{V^{1.84}}{D^{1.16}}\right)\left(\frac{\mu}{\rho}\right)^{0.16} \qquad (10)$$

Letting

$$\phi = \left(\frac{0.08}{g}\right)\left(\frac{L}{D^{1.16}}\right)\left(\frac{\mu}{\rho}\right)^{0.16} \qquad (11)$$

Equation (10) becomes

$$H = 0.0233\,V^2 + \phi\,V^{1.84} \qquad (12)$$

The function ϕ may be evaluated from the nomograph shown in Fig. 2.

Trial-and-error methods have been previously used in finding discharge rates from reservoirs or tanks operated under constant heads. This involved the assumption of a friction factor or discharge velocity, substitution of either value into Equation (8), and subsequent checking of these variables with the Reynolds number. Such methods are obviously indirect and time consuming.

The application of Equation (12) to this type of problem shows the head H to be a direct function of the velocity V where the function ϕ is a constant for a specific piping installation. However, solving for velocity V from Equation (12) is also a trial-and-error proposition, unless the term $0.0233V^2$ is assumed to be negligible. In that case,

$$V = \left(\frac{H}{\phi}\right)^{0.543} \qquad (13)$$

The approximated velocity from Equation (13) must be adjusted by trial in Equation (12) until the correct velocity is obtained.

To eliminate these cumbersome

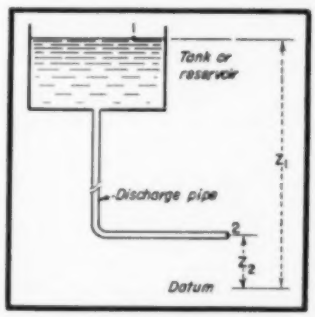


Fig. 1—Tank, discharge pipe and levels

methods entirely, and also to derive an equation which could be used later for problems involving receding heads, a simple function was sought which could be derived from Equation (12).

Equation (12) may be written as

$$H = V^{1.84}(0.0233\ V^{0.16} + \phi) \qquad (14)$$

Since the effect of the term $0.0233V^{0.16}$ is small, it may be given an average value of 0.030. Then

$$H = V^{1.84}(0.030 + \phi) \qquad (15a)$$

$$V = \left(\frac{H}{0.030 + \phi}\right)^{0.543} \qquad (15b)$$

The accuracy of the Equation (15a) was then investigated by calculation of the head H for various discharge velocities. This comparison of Equations (12), (13) and (15a) for reasonable values of the head H is shown in Table I.

The agreement between Equation (15a) and Equation (12) is very good over a practical range of the variables. The effect of neglecting the velocity head is noted from Equation (13). However, only at high velocities and low friction losses is the discrepancy excessive.

Equation (15a) was then chosen as a substitute for Equation (12) since the calculation of velocity from the former involves no trial-and-error methods. A solution of Equation (15a) is possible by the nomograph given in Fig. 3. An example to illustrate the use of this chart follows:

Illustration 1—A constant-head tank is to be constructed which will deliver 4 gpm. of water at 68 deg. F. through an equivalent length of 100 ft. of ½-in. clean steel pipe (Schedule No. 40) to an experimental evaporator. If the fluid is discharged at substantially atmospheric pressure, what head is required above the discharge point?

The solution for the required head may be followed from Figs. 2 and 3. By locating the known variables on their respective scales in Fig. 2 and by using the key shown thereon, the function ϕ is found to equal 1.1. The use of this value of ϕ in Fig. 3 gives a value of approximately 17 ft. for the required head. The value of the head H by slide-rule calculation is 18.2 ft. Because of the large range of the variables, especially ϕ, if accuracy of better than 10 percent is desired, a similar nomograph should be constructed for a limited range.

Case *II*—With a constant positive head in the tank at all times, the problem is to determine discharge through an orifice or short tube.

The orifice equation $u_0 = C\sqrt{2gH}$ is usually assumed to apply in this case. Eliminating the Fanning equation from Equation (7) gives $H = 1.5\ u_0^2/2g$ where the C value is 0.82. However, Dodge[6] recommends a value of C equal to 0.60 for discharge into a gas space through a sharp-edged orifice in a thin plate. For a discharge tube with a length-to-diameter ratio of 3, a value of $C = 0.80$ should prove to be a good approximation.[6] Since this case involves no trial-and-error and is well known, no example need be considered.

Case *III*—With the level receding, the problem is to determine the discharge through L equivalent feet of pipe from a flat-bottomed tank.

By Bernoulli's theorem, for a specified head,

$$H = \frac{u_0^2}{2g} + \Sigma F \qquad (3)$$

$$H = V^{1.84}(0.030 + \phi) \qquad (15a)$$

From a material balance,

$$-\frac{dq}{dt} = u_0 A_p \qquad (16)$$

For a circular tank,

$$-\left(\frac{D_t}{D_p}\right)^2 \frac{dH}{dt} = u_0 = V \qquad (17)$$

Letting the constant $k = D_t/D_p$, and substituting for V in the above equation by means of Equation (15b) yields

$$-k^2\left(\frac{dH}{H^{0.543}}\right) = \frac{dt}{(0.030 + \phi)^{0.543}} \qquad (18)$$

Since ϕ and k are constants for any particular problem, Equation (18) can be integrated between the proper limits, giving

$$t = 2.19\,k^2(0.030 + \phi)^{0.543} \times (H_1^{0.457} - H_2^{0.457}) \qquad (19)$$

where t is the time in seconds to lower the level in the tank from an initial value of H_1 to a final value of H_2. Equation (19) is based on the assumption that turbulent flow exists for all values of the head greater than H_2. By means of the nomograph shown in Fig. 4, Equation (19) may be solved easily for discharge time t. Illustrative Example (2) readily shows the method involved.

Illustration 2—A process tank, 5 ft. in diameter, contains a liquid with the properties of water to a depth of 10 ft. The particular process requires the tank to be emptied in at least 30 minutes through 150 ft. of pipe into a sump. If the end of the discharge pipe is 10 ft. lower than the bottom of the tank, would a 2-in. diameter pipe empty the fluid in the desired time? Assume turbulent flow conditions as the fluid drops from 20 ft. to 10 ft. head.

The pipe diameter is unknown, and since the function ϕ depends on the diameter, a trial-and-error solution of the problem may be made using Figs. 2 and 4. Or, the function ϕ in Equation (11) may be substituted into Equation (19), giving the following equation:

$$t = 2.19\frac{D_t^2}{D_p^2}\left[0.030 + \left(\frac{0.08}{g}\right) \times \left(\frac{L}{D_p^{1.16}}\right)\left(\frac{\mu}{\rho}\right)^{0.16}\right]^{0.543} \times (H_1^{0.457} - H_2^{0.457})$$

In this equation, solution for D_p must still be by trial-and-error methods unless the term 0.030 is assumed negligible, indicating that the head loss due to friction in the pipe is considered to be large compared to the contraction loss and velocity head. If this assumption is made, the equation may be written as follows:

$$t = 0.0843\left[\frac{D_t^2 L^{0.543}}{D_p^{3.63}}\left(\frac{\mu}{\rho}\right)^{0.0869}\right] \times (H_1^{0.457} - H_2^{0.457})$$

For the data given in this illustrative example, solution for the time of discharge t from the last equation gives a value of 21.4 min., if a 2-in. pipe (Schedule No. 40) is used. Therefore, this size pipe should satisfy the operating conditions.

In order to solve this problem by means of the nomographs, assume that the 2-in. pipe will be used. Then find the time required to empty the tank by the following method. First, evaluate the function ϕ by following the dotted lines, as shown in Fig. 2. The function ϕ is equal to 0.42. Second, the ratio of tank diameter to pipe diameter in this case is 29. Using the

Table I—Comparison of Results Obtained With Equations (12), (13) and (15a)

For Values of		Head H Ft. of Fluid			Deviation,
ϕ	Velocity V, Ft./Sec.	Eq. (12)	Eq. (13)	Eq. (15a)	(15a)—(12)
10.0	1.0	10.02	10.00	10.03	0.01
10.0	2.0	35.80	35.80	35.91	0.02
10.0	3.0	75.70	75.49	75.72	0.02
5.0	1.0	5.02	5.00	5.03	0.01
5.0	2.0	17.99	17.90	18.01	0.02
5.0	3.0	37.96	37.75	37.98	0.02
2.0	1.0	2.02	2.00	2.03	0.01
2.0	3.0	15.31	15.10	15.33	0.02
2.0	6.0	54.90	54.06	54.87	−0.03
0.6	1.0	0.623	0.60	0.63	0.007
0.6	5.0	12.17	11.50	12.17	0.00
0.6	10.0	43.84	41.51	43.59	−0.25
0.2	1.0	0.223	0.20	0.23	0.007
0.2	5.0	4.44	3.86	4.44	0.00
0.2	10.0	16.17	13.84	15.92	−0.25
0.2	15.0	34.42	29.18	33.56	−0.86
0.2	20.0	58.86	49.34	56.97	−1.89

k scale and the (ϕ + 0.03) scale of Fig. 4, make an intersection point A on the reference line as shown.

If this point on the reference line is connected with any value of H on the head scale, the corresponding time t will indicate the minutes required to drop from that H value to an H_1 value of zero in Equation (19). If just a short pipe nipple and valve were attached to the bottom of the tank, turbulent flow might not exist at low values of the head. However, in this example and similar cases, the discharge pipe extends 10 ft. lower than the bottom of the tank, so that even as the remaining few inches of liquid drain from the tank, turbulent flow very likely exists.

Finally, connect the point A on the reference line with the head values of 20 and 10. The approximate values of t are $t_1 = 77$ min. and $t_2 = 56$ min. Subtracting these values one finds that roughly 21 min. is required to empty the tank. The actual t values represent the times required to empty the tank from the original 20 and 10 ft. heads if the discharge piping is practically at the same level as the bottom of the tank and if turbulent flow exists for all values of the head. When these t values are subtracted, the difference should be correct, for any error in the total time of t_1 and t_2 at low heads will cancel out.

Case IV—With the level receding, the problem is to determine the discharge through an orifice or short tube from a flat-bottomed tank.

In this case Equation (19) should apply, except that a strain is placed on the equation at ϕ values of less than 0.20. Therefore, assuming that the orifice equation $u_2 = C\sqrt{2gH}$ applies at any time t, a substitution of this equation into Equation (17) with subsequent integration between the proper limits yields

$$t = (2/k')(\sqrt{H_1} - \sqrt{H_2})$$

where

$$k' = D_2^2 C \sqrt{2g}/D_1^2$$

The coefficient of discharge C may be evaluated as in Case II.

Caution should be used in applying this equation if H is rather small. As indicated by Dodge[2], at very low heads the orifice equation may not hold, and the coefficient of discharge may vary with the head. Difficulties due to vortex formation and the effects of surface tension may exist also.

The methods illustrated in the previous four cases depend on the reliability of Equation (9). On comparison of the Hazen and Williams formula for the flow of water with the Fanning equation where $f = 0.04 \times N_{Re}^{-0.16}$, one finds that the roughness factor C' in the Hazen and Williams equation is equal to 128. This C value corresponds to that of new steel or cast-iron pipes. Pigott and Kemler[4, 5] have shown that as the diameter of the pipe decreases, the relative roughness increases. For pipes of less than 1-in. inside diameter, the effect of the relative roughness may cause an appreciable increase in the friction factor over the value calculated from Equation (9).

Where roughness is a minor factor, as in pipes of very large diameters, the friction factor approaches that of smooth tubing and may be somewhat less than the value calculated from Equation (9) for which the Reynolds numbers vary from 2,000 to 20,000,000. If the design is to be based on pipe which will be badly corroded in a number of years, then the equations derived (15*b* and 19) may be corrected as follows: (*a*) In Equation (15*b*), multiply V by $C'/128$. (*b*) In Equation (19), multiply t by $128/C'$.

The roughness coefficient C' may be found from Perry's "Chemical Engineers' Handbook," or any reference on hydraulics, and will vary with the condition of the pipe. It was originally introduced in the Hazen and Williams formula for the flow of water in horizontal pipes where

$$V = 1.318\, C' (D/4)^{0.63} (F_g/L)^{0.54}$$

For smooth brass, copper or lead pipe $C' = 140$.

In summary, for a rapid estimation of discharge velocities and time of discharge of various liquids from tanks, the application of the formula $f = 0.04\, N_{Re}^{-0.16}$ gives comparatively simple equations which can be solved by the nomographs given in this article, thus eliminating the trial-and-error work heretofore required.

The authors wish to thank Robert D. Todd and Harry W. Wilson for checking some of the calculations.

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Pacific Power

Continued from page 101

along the lower Columbia basin are being postponed because the supply of firm power is barely sufficient for present plants. Ten years ago the problem of the Northwest was to develop markets for its electric energy; now the greater problem is to get the energy to supply the markets.

This heavy draft on the power supplies of the Pacific Northwest has come largely from chemical and metallurgical plants that have been built since 1941. Four reduction works, for example, now take almost 50 percent of the output of Bonneville Power Administration and 25-30 percent of the total power load of the utility system—public and private—in Oregon and Washington. This aluminum industry would expand in the Northwest if it could get the power. Three aluminum producers are now surveying power prospects in western British Columbia; each of the plants would need 750,000 kw. or more.

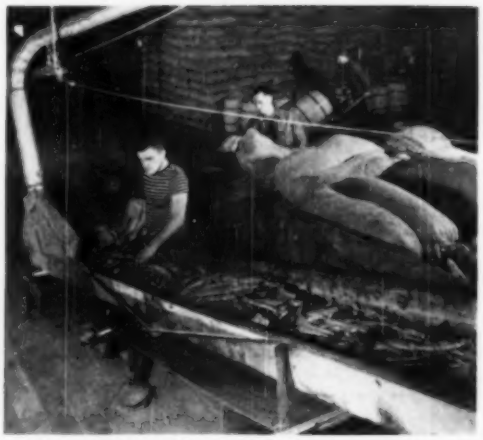
Fuel-base energy is not important in the Northwest: it has plenty of hydro sites, next to no cheap fuel (although natural gas from Alberta now looks likely). In 1930, fuel plants supplied 19 percent of the electric power in Oregon and Washington; in 1945 the figure was down to 2 percent. The scarcity and rising costs of California oil and Utah coal have added to the problem of local power supply during the past two seasons.

Well over 50 percent of the total electric power of the Pacific Northwest comes from the government-owned Columbia River system. The program of developing the Columbia River Basin (to which the government is committed) and the surplus power from new large-scale irrigation projects in the area, will keep the ratio of water power high. Approved plans call for building new dams and generating facilities along the Columbia, Willamette and Snake Rivers and their tributaries and for doubling the capacity of Grand Coulee to an ultimate of nearly 2,000,000 kw. Some of the privately-owned utilities and municipal systems of the Northwest are also enlarging their generating facilities.

Our analysis of the Pacific Northwest: (1) the area will have a tight power period until about 1954; (2) new chemical and related industries will find it hard to get large blocks of electric energy for several years; (3) cheap hydro power from huge government multiple-purpose projects will continue to dominate the area; (4) the present low rates (2 mills per kwh. for 100 percent load factors) will probably be increased; (5) within the next decade or so the Pacific Northwest will become a major electrochemical and electrometallurgical center of the nation.



PEPPERMINT leaves, giving 100 percent greater yield of oil in the Northwest, are steam distilled on the farm.



CASCARA bark, after grading, above, is processed and shipped to manufacturers as a soluble, powdered product.

The Callisons apply modern techniques to their local raw materials. The result . . .

Botanical Bonanza

RAY BLOOMBERG

At the turn of the century, I. P. Callison of Chehalis, Wash., was a small-town feed dealer with an eye for opportunity. So he branched out into botanicals, didn't hesitate to use new processing and engineering methods nor to capitalize on opportunities native to the Northwest (creating new ones in stride) to such an extent that I. P. Callison & Sons now (1) supplies 70 percent of the world's cascara—and has just developed a basically improved product; (2) turns out some 60 percent of the nation's digitalis by an improved process; (3) since 1943 has become the second largest domestic producer of refined peppermint oil—and can boast of the world's first continuous peppermint oil fractionating plant.

Raw materials for the Chehalis plant are all naturals for the Northwest: the cascara tree grows only in that area's rain belt; foxglove, source of digitalis, grows wild in the region; peppermint in the Northwest gives up to 100 percent greater yields of oil than in other regions. The firm is still pioneering; experimental plantings of spearmint—the first in the area—look extremely promising.

Mr. Bloomberg is Northwest Correspondent for Chemical Engineering. *He is located in Seattle.*

CALLISON'S PRIDE

But the firm's pride hinges on its new $100,000 continuous still for fractionating peppermint oil—said to be the world's first—that has just gone on stream. The 50-ft. unit was designed by Chief Chemist Paul A. Tornow and E. B. Badger & Sons. It gives greater refinement of the crude oil, more precise isolation of fractions and better quality control over the final product. For the first time commercially, intermediate fractions can be separated and the natural flavor and odor of the oil retained through using relatively low temperatures that do not cause thermal decomposition. The still, replacing the usual small pot stills used by the firm since 1943, has a daily capacity of more than 2,400 lb. of oil.

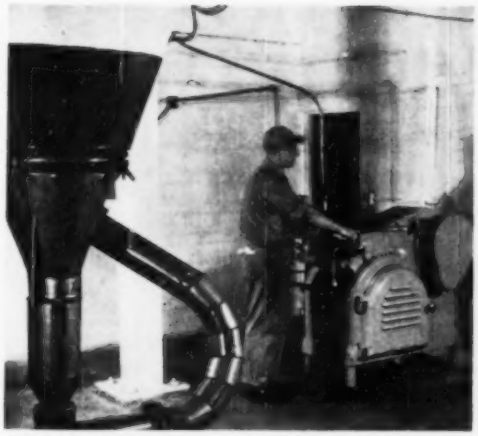
When the peppermint plant matures it is cut like hay and allowed to wilt in the field until it loses about 30 percent of its moisture. The leaves are then packed into covered tubs on the farms; these are about 8 ft. high and 8 ft. in diameter. Steam from a small boiler is fed into the bottom through a perforated pipe, filters up through the leaves and drives off the oil—which escapes with the steam to a condenser and then a decanter. Here the oil rises to the top and is drawn off into 50-gal. galvanized drums that are stored in a cool place by the farmers until Callison trucks pick them up. Some 2-3 tons of hay will give about 50 lb. of crude oil. Northwest yields average close to 50 lb. of oil per acre compared with 25-35 lb. in the Midwest.

At the Callison processing plant, each drum of farmer's oil is carefully analyzed for chemical constituents and classified by taste and odor. The drums are stored at 45 deg. F. until needed, then taken by hand truck to the still. The oil is pumped into stainless steel blending tanks; empty drums are cleaned with steam and solvent. Blended oil is pumped into a 1,500-gal. tin-lined copper holding tank at the bottom of the still. Then another pump sends it to the "heads" column at a controlled rate.

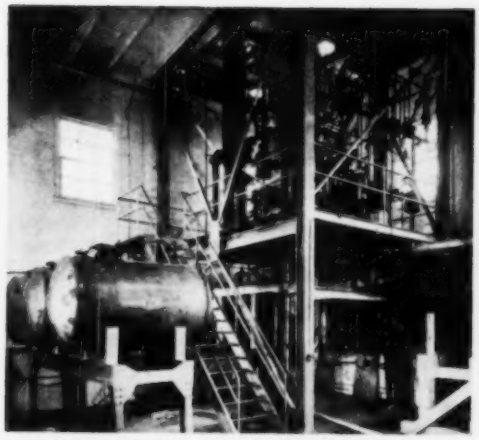
DISTILLING AT CHEHALIS

This column has a number of horizontal bubble-cap plates at 1-ft. intervals. It is of tin-lined copper construction—as are the 0.5-4.0 in. pipes in the still. Low-pressure steam enters near the bottom, escapes at the top. Oil enters the column at one of the middle plates.

Light, lower-boiling fractions in the oil rise to the top as vapors with the steam, pass through a condenser and a reflux decanter. Oil rises to the top and drains off through a weir back into the column. Water goes under



SPRAY DRYER, bottom at left, instantly evaporates moisture from cascara percolate. Solids are blown to cyclone.



CONTINUOUS STILL with very high reflux ratio, concentrates and isolates minute fractions of peppermint oil.

a baffle plate rising from the bottom of the decanter and is piped off into a stripper. Here residual oil is boiled off and goes through a condenser to be sent back to the heads column.

Medium and high-boiling fractions are drawn up by a pump into the "products" column; steam is again introduced at a slightly higher temperature. The process is repeated here, the residual light oils rising as vapor into the condenser, then to the decanter. Water goes to the stripper and recovered oil returns to the heads column. Finished oil is drawn off one of the upper pasteurizing plates, decanted to separate oil from the water, then piped into stainless steel storage tanks. Bottom oils from the products column are drained off as waste tars; they amount to about 2-4 percent of the total weight.

Most important single advantage of this type of still is its capacity for concentrating and isolating minute fractions of peppermint oil. This is possible only because of a very high reflux ratio that can be kept without lowering the efficiency of the still. These fractions are bled off into small holding tanks; some have no value while others are used in compounding.

Refined oil is pumped from the product storage tanks into blending tanks, then through a 15,000-rpm. centrifuge which takes out excess moisture and solids. The oil is drained off into drums and is ready for shipment throughout the country; about 50 percent of it ends up in chewing gum.

The new Callison plant emphasizes the growing importance of the peppermint oil industry in the Northwest. Last year, for the first time, the Washington and Oregon output—more than 800,000 lb. valued at $5,350,000—topped that from the Midwest. Callison's faith—or vision—is this: he built his plant with a capacity to handle more than the present entire Northwest crop.

CASCARA CONCENTRATE

Callison's big volume product is cascara; it handles about 70 percent of the Northwest's entire volume of 4,500,000 lb. annually—the world's supply.

Until this year, the firm shipped the raw, ground bark to pharmaceutical manufacturers. But a concentrating process was developed, and now it makes a soluble, powdered product. About 100 lb. of bark will give some 23 lb. of the concentrate.

Bark from the cascara trees is ground, sacked and aged for 1-2 years in a room where air can circulate freely. It is then mixed with water and—where specified—magnesium oxide is added as a de-bitterizing agent. The wet mixture is spread on an acid-resistant floor for 24 hr. to macerate and complete the de-bitterizing action.

The mixture is then placed in a steel percolator with a capacity of 800 lb. of bark. Steam is fed in under slight pressure to keep the water at 212 deg. F. for 2 hr.

Thin "percolate" is piped to a holding reservoir, then to evaporators where it is reduced to 25 percent solids. A centrifuge removes insoluble material.

A high pressure pump—capable of 5,000 psi. but usually operated at 3,000-4,000 psi.—forces the concentrate from the holding tank to the top of a stainless steel spray dryer similar to the type used for whole milk. The mixture is forced out of the atomizing nozzle into a chamber where air at 250-300 deg. F. enters from the sides at the rate of 7,500 cfm. Moisture is evaporated almost instantly. The dried solids drop into an 8-in. stainless steel pipe and are blown by a high-velocity fan into a small cyclone where the solids are separated from the air.

Exhausted air from the cyclone passes into a second chamber and finally into a fines collector; both are connected with the packaging room by the same pipe that serves the first cyclone. The final concentrate is packaged in moisture-proof lined barrels of 50, 100 and 200-lb. capacity.

The cascara reducing process—first in the field—has two major advantages: (1) it reduces shipping weight of the product by about 75 percent; (2) it gives pharmaceutical houses a ready-to-use material of uniformly high quality.

DIGITALIS DRYING

Digitalis is a drug made from the leaves of the foxglove; it is used for some types of heart disease. Callison was a big factor in the digitalis business during World War I when the European source of supply was cut off. He spurted ahead in 1937, is now the biggest supplier of the domestic market.

Chemical engineering methods were used again. Result: a refined drying method—one that gives a superior product—was developed and commercialized.

Editorial Viewpoints

SIDNEY D. KIRKPATRICK and Staff

New Spring Clothes

This month, as we hope you've noticed, *Chemical Engineering* stepped out in the Easter parade! We have some new clothes and we hope they're becoming. More important, we hope they'll wear well with you. They were designed not only for appearance and character but also for utility and convenience.

From the front cover and contents page, through the articles to such exclusive editorial features as our *Chemical Engineering* reports and pictured flowsheets and on to the departments—all reflect the skillful touch of the designer, George A. Dusenbury of Tryon, N. C., an acknowledged expert in the graphic arts.

His work is based on long experience and research in the art of presenting text and pictures, particularly to busy people in industries and professions. Our own readership studies, in which several thousand of you have willingly cooperated during the past few years, have convinced us that chemical engineers are appreciative of the time and effort invested in the preparation of their publications. Design is important not only in what meets the eye but in the substance and purpose it serves. Again we say we hope you like our "new look" but we won't forget that it's what's underneath that counts.

"The Half-Way House"

On the career curve of the average engineer there is often a discouraging slump—or letdown—during the first few years after graduation. Training-in-industry programs and self-improvement courses are sometimes prescribed as antidotes. But one of the very best solutions is an interesting, challenging job that calls for new knowledge, skill and experience. And seldom is there a better place to find it than in the pilot plant.

Bob Semple, director of Monsanto's development department, has often given sound advice to young chemists and engineers in his own company and elsewhere. None is sounder, however, than that presented last month in his ACS paper at the San Francisco meeting. He showed clearly how the transition function of the pilot plant in advancing a process from the laboratory bench to the drafting table can also advance the progress of the individual.

The average pilot-plant project touches on many phases of company activity, according to Mr. Semple. "Sales and sales development are vitally concerned. Production is preparing to take over. Engineering is designing and planning construction. Service departments, such as accounting, purchasing, traffic and safety, are contributing. Thus an unusual opportunity exists to learn the scope, philosophy and methods of these important activities."

Unfortunately very few companies can offer all their new employees an opportunity to continue their education under such inviting circumstances. Nor do all young engineers have the required aptitudes for good pilot-plant technologists. But where it is possible to match the man with such a job, both will be benefited. "The technologist can find no better medium than the pilot plant for equipping himself with vital experience in the realm of 'if and how.'"

Reppe Chemie—USA

When American technical intelligence personnel pushed their way into German chemical plants just before and immediately after V-E Day, the name we heard most often was that of Dr. J. Walter Reppe of the I. G. What he had apparently been able to accomplish with acetylene reactions under high pressure and temperatures seemed to open up an entirely new field of chemistry, which we promptly christened "Reppe Chemie." Some of us at that time were particularly interested in a product called "Koresin" which the Germans used for tackifying synthetic rubber. When we found that Reppe had made it by reacting acetylene with *p*-tertiary butyl phenol, we gleefully cabled that information back to our Washington headquarters. A short while later the reports came back that the U.S. patents on Koresin had just been discovered in the files of the General Aniline and Film Corp. To that extent our investigations were worthless; we might better have stayed at home!

But in the four years since V-E Day a lot of work has been done in this country to master the wild and dangerous reactions of Reppe chemistry. General Aniline, in its central research laboratories at Easton, Pa., concentrated on the study of these processes from a scientific standpoint. Their work was taken over by the development and engineering groups at the Grasselli, N. J., works where, on March 21, a very remarkable pilot plant was officially dedicated to the "Development of Acetylene Chemistry in America." From its barricaded explosion stalls and remote controls, to its super-fractionators and specialized equipment for maximum safety and efficiency, this new plant is a model of engineering design and

construction. Comparable facilities have never before been available—even in Germany—to explore the full potentialities of acetylene chemistry. It can mean much to the American chemical industry.

A Job for NACE?

Protective coatings are one of several means of preventing the corrosion of chemical process equipment. Such coatings have been available to the chemical engineer for many years and some of them have much to recommend their use. Nevertheless, coatings have not yet been employed extensively. One reason is undoubtedly the skepticism built up in the minds of engineers by the unjustifiable claims made for numerous products of uncertain composition and parentage. Unfortunately, this practice is tending to discredit certain corrosion-resistant linings that have been developed by reputable and technically qualified companies.

The sheep might be separated from the goats if proper publicity were given to the basic composition of these materials. The problem might also be solved if more data were released on physical properties, resistances and non-resistances, and the limitations of each compound. Information of this kind has been freely supplied by the manufacturers of metals and alloys; standard use and test specifications have been established and are universally accepted and adhered to. Trade names are used, but only as a more convenient "handle" and to identify the source, rather than to obscure the composition of the alloy.

The solution of this problem cannot be successfully accomplished by one individual or one company. It requires the aggressive support and promotion of an impartial organization such as the National Association of Corrosion Engineers.

Floz-on and -Off

There should be a lesson for everybody—consulting engineers as well as investors—in the sensational rise and fall of the latest promotion in the field of petrochemicals. A weird scheme for synthesizing glycols by the catalytic pyrolysis of natural gas might have been dismissed as just another wild bid for publicity except for the eminent technologists whose names became associated with it as consultants or independent investigators.

We first became suspicious when one of our weekly contemporaries published a news item to the effect that "The Floz-On Mfg. Co., Pittsburgh, has broken ground for the construction of a $1,500,000 anti-freeze plant in Houston, Texas . . . with an annual output of 25,000,000 gal. of ethylene glycol." We became more suspicious when we learned that the money was to come from a well known mail-order house, but only after an independent engineering investigation had corroborated claims that had already been confirmed by other consultants of excellent reputation.

Now the real story comes out. The mine had been "salted." An ingenious reservoir had been concealed in one of the condensers and from it came the glycol vapors that the first consultants had collected and carefully analyzed. The quantities so obtained corresponded with the theoretical values calculated from the carbon-water balance. But it remained for the other consultants to discover the deception—and to save their client the $1,500,000 that was to pay for the Houston plant. Meanwhile, we are told that the inventor has been fired and his records turned over to the proper authorities.

The eminent engineer has admitted his error in one of the most amazing statements we've ever read. But we'd feel better about the whole affair if it did not reflect so unfavorably upon the detective abilities of some of our engineering consultants.

Willard Henry Dow, 1897-1949

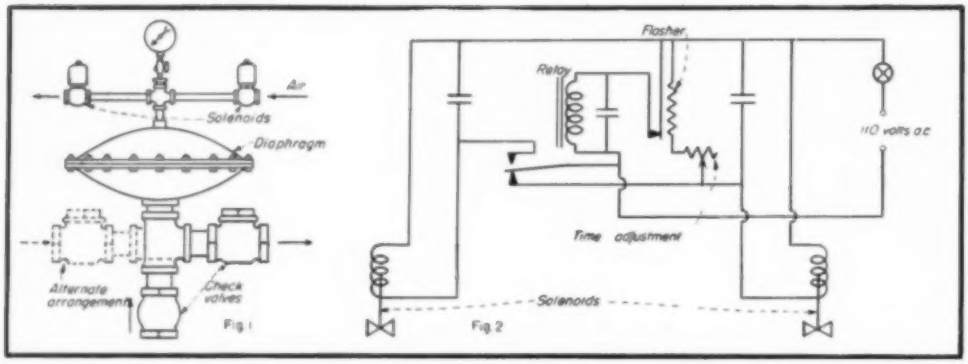
> "But the noblest aim before us, gentlemen, the one which most amply justifies us before all the world is our ambition for the enlightenment and ample equipment of our successors. . . . We begin as brothers. We will inevitably close our careers as fathers, passing on to our sons in the profession a heritage of knowledge and light that will increase as the flame increases with the increase of fuel."

These words, uttered forty years ago by a great leader of our profession, take on deeper significance in light of the tragic death on March 31 of Dr. and Mrs. Willard H. Dow. They were on their way to Cambridge to attend the M.I.T. convocation but also to visit their son, Herbert H. Dow, 2nd, who is studying there presumably to follow in the footsteps of his distinguished father and grandfather. We who are parents know how much their lives were wrapped up in his and his sister, Helen's. Both must now bear a heavy burden of sorrow and responsibility.

Yet there must also be comfort and consolation as well as challenge for them in the great record of Dow achievements. Dr. Herbert H. Dow fought hard to lay the foundations for one of America's most basic chemical industries. When he died in 1930 at but 64, he passed on to his son at 33 a "heritage of knowledge and light" that has indeed increased in power and influence, far beyond the father's fondest expectation. Today the Dow Chemical Co. is the center of an empire of which the late Dr. Willard H. Dow was the master planner and builder. His work will be carried on by loyal and able associates. We who knew him as friend and brother in our profession mourn his passing. But all of us are better men because of the high standards he set for chemical engineering and for chemical industry.

The Plant Notebook

THEODORE R. OLIVE, *Associate Editor*



Inexpensive Diaphragm Pump Operates on Air Pressure

HERBERT T. BATES, *Department of Chemistry and Chemical Engineering, University of Nebraska, Lincoln, Neb.*

★ **February Contest Prize Winner**

A diaphragm pump suitable for corrosive liquids was built in our shop as shown in the sketch at the left above. Only two check valves, two solenoid valves, a diaphragm chamber, and some connecting piping were used for the pump. A relay, a flasher button, an adjustable resistance, and some condensers compose the electrical circuit.

Compressed air is admitted to the top of the diaphragm through one solenoid valve. The electrical circuit opens and closes these valves alternately, giving the reciprocating motion. Liquid flows into the pump by gravity during the time the air pressure is off, and it is forced out when the air pushes the diaphragm down.

The electrical circuit used is shown in the sketch at the right. The solenoid valves are operated alternately by the double throw relay. The relay is operated by the contacts of the flasher button, whose heater is connected to the lower relay contact. The flasher we are using is an Amperite thermostatic delay relay having the bimetallic strip contacts and heater in a vacuum tube. These are available in several time delay ranges from 5 sec. through 120 sec. (This refers to the time the contacts are open.) They are compensated for temperature variation between minus 55 and +70 deg C.; so the pumping cycle is quite uniform.

We have also used the common flasher button obtainable at variety stores. When these are used the heater should be disconnected from the contacts and wired as shown in the circuit diagram. These flashers give more rapid operation, about 3 to 5 sec. for the entire pumping cycle. Most flashers overheat and then cool a long time before the contacts open. An adjustable resistance in series with the heater will make it possible to even up the cycle as well as to give some control of the complete cycle time.

Because the solenoids produce a jar when they close, it was found best to mount the relay box at a distance from the pump. It was also necessary to mount the flasher in a flexible mounting to prevent the relay from affecting the contacts.

The condensers were connected across the relay coil and the coils of the solenoid valves to reduce sparking and sticking of the contacts. Condensers of 5 microfarads rating were used across the solenoid coils, and 1.0 microfarad across the relay coil. The sizes do not seem to be critical, but they should be chosen to reduce the induction of the coils at the 60-cycle supply frequency.

Displacement of the diaphragm should be rather large to minimize the losses due to opening and closing of the check valves. Our pump has a 14-in. diameter diaphragm with about 150 cu. in. displacement; the liquid line is 2-in. i.p.s. size. The inlet check valve can be either a vertical or horizontal one as the dotted lines in the figure show. Check valves and pipe fittings are available in a wide variety of corrosion resistant materials. If the diaphragm chamber is constructed of steel, the lower half can be painted for protection.

The arrangement described is suitable for an application where the liquid will fill the pump by gravity flow. In cases where a moderate suction lift is necessary, the exhaust solenoid valve can be connected to a vacuum line. The available air pressure must, of course, exceed the pressure against which the liquid is being pumped.

Pitot Tube Traverse Improved By Use of Gauss' Formula

ROBERT W. SCHNEIDER, *Chemical Engineer, Lehigh University, Bethlehem, Pa.*

It is often necessary to obtain the average velocity of a gas in a circular duct by means of a pitot tube traverse. By applying Gauss' formula for numerical integration, it is possible to determine where the pitot tube readings should be taken. The formula is then used to obtain the average gas velocity from the point velocity measurements.

Kroll (*Chem. Eng.*, Sept. 1946, p. 102) discussed this method for making a four-point traverse. The follow-

ing list gives all the necessary information for making a three- to a seven-point traverse.

The velocities should be read at r_1, r_2, etc., where the r's are given as some fraction of the duct radius R. The negative signs merely denote direction and the distances are measured from the center of the duct along a diameter. The term V_1 is the velocity reading at point r_1.

Three Point Traverse

$r_1 = -0.880R$; $r_2 = 0.0R$; $r_3 = 0.880R$.
$V_{avg} = 5/18(V_1 + V_3) + 4/9(V_2)$

Four Point Traverse

$r_1 = -0.928R$; $r_2 = -0.583R$; $r_3 = 0.583R$; $r_4 = 0.928R$.
$V_{avg} = 0.1739(V_1 + V_4) + 0.3261(V_2 + V_3)$

Five Point Traverse

$r_1 = -0.952R$; $r_2 = -0.733R$; $r_3 = 0.0R$; $r_4 = 0.733R$; $r_5 = 0.952R$.
$V_{avg} = 0.1185(V_1 + V_5) + 0.2393(V_2 + V_4) + 0.2844(V_3)$

Six Point Traverse

$r_1 = -0.967R$; $r_2 = 0.813R$; $r_3 = -0.488R$; $r_4 = 0.488R$; $r_5 = 0.813R$; $r_6 = 0.967R$.
$V_{avg} = 0.0857(V_1 + V_6) + 0.1804(V_2 + V_5) + 0.2340(V_3 + V_4)$

Seven Point Traverse

$r_1 = -0.975R$; $r_2 = -0.862R$; $r_3 = -0.637R$; $r_4 = 0.0R$; $r_5 = 0.637R$; $r_6 = 0.862R$; $r_7 = 0.975R$.
$V_{avg} = 0.0647(V_1 + V_7) + 0.1398(V_2 + V_6) + 0.1909(V_3 + V_5) + 0.2090(V_4)$

For example: If a three-point traverse is to be made in a 5-in. round duct, the pitot tube readings should be made at the following points: $r_1 = -0.880(2.5) = -2.2$ in. from the center of the duct (i.e., far side); $r_2 = 0(2.5) = 0$ in. (center of duct); $r_3 = 0.880\ (2.5) = 2.2$ in. from the center of the duct (i.e., near side). The average velocity is then found by substituting each of the point velocities in the equation given for the three-point traverse.

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2. Sherwood and Reed, "Applied Mathematics in Chemical Engineering," p. 275-7, McGraw-Hill Book Co., Inc., New York (1939).

How to Estimate Contents of Vertical Cylindrical Vessels

BRYCE I. MACDONALD, JR., *Chemical Engineer, General Electric Co., North Troy, N. Y.*

Chemical engineers are always fond of short-cut mental calculations. Here is a lightning-quick mental method for estimating the contents of cylindrical vessels standing on end—or for the contents per inch of length for fully filled horizontal cylindrical vessels or pipes.

It is only necessary to know the inside diameter of the vessel or pipe to be able to estimate the gallons per inch of height within 2 percent. Simply square the diameter in feet, divide by 2, and you have the gallons per inch of height (or length for filled horizontal tanks or pipes). Here is how it works:

Let D = vessel diameter, feet, and G = gallons per inch of height. Then $G = (\pi D^2/4)(1/12)(7.481) = 0.490D^2$. Hence, using the rule for estimating, $G = D^2/2 = 0.500D^2$, the percent error is $(0.500 - 0.490)/0.490 \times 100 = 2.04$ percent.

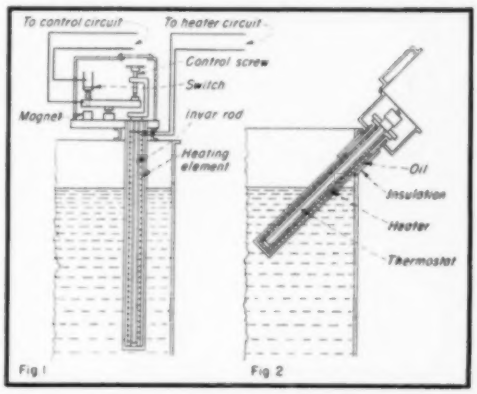


Fig. 1 Fig. 2

Level Control Instrument for Brine Containing Solid Salt

R. BLOCH, L. FARKAS and G. STEIN, *Department of Physical Chemistry, Hebrew University, and Palestine Potash, Ltd., Jerusalem, Palestine.*

Various instruments have been used in industrial practice to keep liquids in a container at a desired height, or between two prescribed levels. Float-actuated instruments, devices based on static or differential hydrostatic pressure, electric contact type indicators and others have been developed for this purpose. While each of these instruments has its special advantage and sphere of application, they are not suitable for the control of saturated brine in contact with solid salt or corrosive sludges. Moving parts or orifices of the instruments are affected and clogged in such a medium, and level-indicating electrodes are often disconnected by the deposition of salt or other materials.

In the following, an instrument for the above-mentioned purpose is described which is free from these disad-

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★ MARCH PRIZE WINNER—A $50 prize will be issued to . . .

ROBERT L. MILLER
Plant Engineer, Kamen Soap Products Co., Barberton, Ohio.

. . . for an article describing an effective means of radically reducing power requirements of star feeders and rotary air locks used in feeding sticky powders, which has been judged the winner of our March contest. This article will appear in our May issue.

$50 PRIZE FOR A GOOD IDEA—Until further notice the Editors of *Chemical Engineering* will award $50 cash each month to the author of the best short article received that month and accepted for publication in the Plant Notebook.

The winner each month will be announced in the issue of the next month, e.g., the April winner will be announced in May and his article published in June. Judges will be the Editors of *Chemical Engineering*. Non-winning articles submitted for this contest will be published if acceptable at our usual space rates.

HOW TO ENTER CONTEST—Any reader of *Chemical Engineering*, other than a McGraw-Hill employee, may submit as many entries for this contest as he wishes. Acceptable material must be previously unpublished and should be short, preferably not over 300 words, but illustrated if possible. Articles may deal with any sort of plant or production "kink" or short-cut that will be of interest to chemical engineers or others in the process industries.

Also, novel means of presenting useful data, as well as new cost-cutting ideas, are acceptable. Address Plant Notebook Editor, *Chemical Engineering*, 330 West 42nd St., New York 18, N. Y.

vantages. Its operation is based on the fact that the over-all coefficient of heat transfer by convection from a metal tube to a liquid is much greater than to a gas. Consequently, a tube or wire heated by a given heat input and immersed in a sludge or brine, will attain a lower temperature than if it were in contact with air.

Three such instruments of different design, but all based on this principle, were constructed and tested. The actual problem to be solved was the following: A saturated brine containing suspended salt flows more or less steadily into a stirred tank. When the level of the brine reaches a predetermined height, a pump is cut off. It is again set in motion automatically when the level of the liquid sinks to another predetermined level.

Fig. 1 gives the sketch of an instrument in which a commercial thermoregulator of the differential expansion type was changed into the control device by winding a heater element on the Invar rod. The heater element, insulated from the Invar rod by asbestos, was made of Nichrome wire and could be supplied with energy at the rate of 0-60 watts.

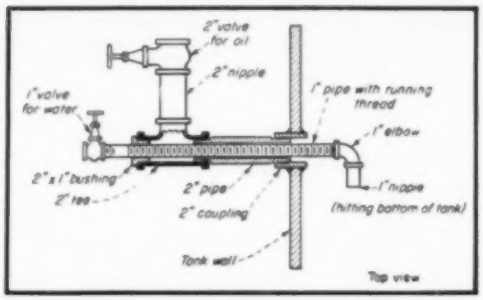
The thermoregulator makes or breaks a contact at a preselected temperature which is set between the temperatures the thermoregulator attains when heated in the liquid, and in air. Accordingly, the setting of the control screw and the heat input of the heater coil will determine the time lag for "make" and "break" of the switch. It was found that the lag between "make" and "break" could be adjusted to any desired value between a few seconds and several minutes and that the thermoregulator setting was a much stronger influence on this adjustment than the value of the heating wattage. Substantially the same lag could be produced with the thermoregulator either immersed or exposed to the air, or the lag could be made long for immersion and short for exposure, or vice versa.

Varying the temperature of the liquid between 20 and 40 deg. C. seemed to have no perceptible effect on the time lag of either the cooling-off or heating-up period. This is due to the comparatively large temperature difference between the control element and the brine, even when the latter is at 40 deg. C.

A similar construction for the thermostatic level control is given in Fig. 2. The heating unit was wound on a perforated aluminum tube into which the "leg" of the thermoregulator fitted loosely. By means of a transformer, the heat input could be regulated between 0 and 100 watts. Thermal contact was insured by oil. (Dowtherm B might be used, too.) While this construction is simpler, its time lag is somewhat longer than that given in Fig. 1. By fitting the level control instrument into the tank at a certain angle to the horizontal, the delay time can be changed.

A third design of the new level control instrument was an arrangement in which the heater and the thermosensitive element were combined. A wire was heated by a constant current and the change of its resistance upon immersion and exposure to the air was used in an appropriate electronic circuit to operate a Thyratron which, in turn, activated the mechanical relay of the pump. The heated wire was made of platinum (0.15 mm. dia.), and had 11 ohms resistance at room temperature. It was wound on a porcelain tube (75 mm. long and 6 mm. dia.) which was protected by a metal tube from direct contact with the brine.

In summarizing it should be mentioned that, apart from the advantage that in all three designs a water-tight housing protects the sensitive element of the instrument against any damage, the comparatively high temperature of the housing insures that no salt deposition will occur in the instrument.



Water Decanting Connection for Oil Storage Tanks

MELVIN NORD, *Nord & Co., Inc., Keyport, N. J.*

In steam distillation and other processes, an undesirable situation sometimes occurs in which water is carried over to the storage tank along with the product. The water settles to the bottom of the tank and accumulates until it reaches the level of the valve nearest the bottom of the tank. If this valve is several inches above the bottom of the tank, it is not possible to draw all the water off through the valve without also drawing off a large amount of oil. In fact, it is practically impossible to obtain a product free of water from such a fitting, particularly if water continues to settle out at a slow rate. Entrained water may make the product cloudy, so as to worry the prospective user, or it may actually interfere with the use of the product.

This problem does not of course arise if there are two fittings near the bottom of the tank—one below the other. In that case, water is drawn off the lower one until some of the product first appears. Then pure product can be drawn off from the upper fitting. In some cases it is not feasible to install the second fitting after the tank has been in use—as the material which was last in the tank may have been flammable, so that welding or cutting is undesirable. In that case the following method may be used.

Assume that there is a 2-in. coupling welded near the bottom of a tank. It is possible to install two concentric pipes into this fitting, the outer pipe merely being screwed into the 2-in. coupling, the inner one going into the inside of the tank with an elbow and nipple reaching the bottom of the tank, as shown in the accompanying sketch. The pressure of liquid in the tank forces the water out the inner pipe whenever the valve at its end is opened, thus making it possible to draw the water off below the product draw-off level. In this way, the same effect is obtained as if there were two separate fittings on the tank. The tank must of course be empty when this installation is made. In order to assemble the system, one starts with the 2-in. piping, including the tee and the 2x1-in. bushing in position. The 1-in. pipe (containing a running thread) is screwed into the bushing until tight and the 1-in. elbow and nipple are then fastened inside the tank.

The situation may also be the reverse of that described above, in that the valve may be at the very bottom of the tank. In this case, water cannot be completely removed through the bottom fitting if any settling of water continues. Every delivery from the tank would contain some water until settling out of water in the tank has been completed. In order to avoid this difficulty, the method described above may be used in a "reverse" manner. In this case, the nipple inside the tank points upward instead of downward, and the smaller pipe is the product draw-off, while the larger pipe is the water draw-off.



SOUTHWEST BOOM

The wartime rush to the rich raw materials and resources of the Gulf Coast has lost some of its impetus. But in its place there is now better integration into the growing needs of consuming industries. Also more profitable production as new technology takes fuller advantage of its inherent opportunities.

CHEMICAL ENGINEERING REPORT — APRIL 1949

ALTHOUGH four years have passed since the war ended, the chemical industry in the Southwest is still well astride the wave of construction that swept over the region after 1941. It is true that the early sweep of the wave is no longer as pronounced as it was 12 months ago, but the industrialization of the Southwest continues under its initial impetus.

New plants: up and coming

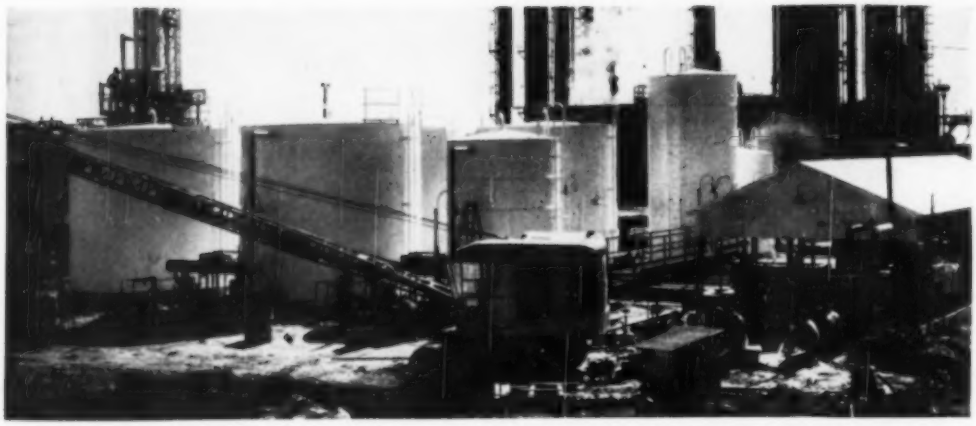
To take a quick glance at chemical plant completions last year:

Almost all of the completions were on the Gulf Coast, where emphasis has continued on petroleum-based chemicals and chemicals required in their manufacture. The list includes: Carbide and Carbon Chemicals Corp., Texas City, vinyl resins; Commercial Solvents Corp., Sterlington, La., synthetic methanol; Diamond Alkali Co., Houston, caustic soda and chlorine; Diamond Alkali Co., Dallas, increased sodium silicate production; Esso Standard Oil Co., Baton Rouge, iso-octyl alcohol; Frontier Chemical Co., Denver City, Tex., increased caustic soda and chlorine production; Gulf Chemical Co., Houston, sodium and calcium phosphates; Jefferson Chemical Co., Port Neches, Tex., ethylene oxide, ethylene glycol and other petrochemicals; McCarthy Chemical Co., Winnie, Tex., acetaldehyle, methanol, formaldehyde; Rohm & Haas, Houston, raw materials for acrylic resins; Stanton Chemicals, Corpus Christi, aromatics and derivatives.

In 1948 Shell Chemical Corp., at Houston, had a banner year in completions of facilities for the manufacture of petrochemicals. During the year Shell put into operation units for the production of ethyl chloride, ethanol, methyl ethyl ketone, secondary butanol, hexylene glycol, and synthetic glycerine, the first time synthetic glycerine has been produced commercially. The work at Shell Chemical last year substantially completed the postwar expansion program of this company.

$70-80 million

No accurate figures on the total investment for chemical plant completions in 1948 are available. Judging from reported investments and the probable costs of construction for which capital data are not available, the total investment was probably between $70 and $80 million. This does not include construction of facilities for petroleum refining and plants for extraction of natural gasoline and individual hydrocarbons from natural gas and casinghead gas. (Over)



CHEMICAL CONSTRUCTION CONTINUES. Above is the McCarthy Chemical plant completed last year. Opposite are . . .

Had construction costs not continued their climb last year, the volume of investment in completed plants and projected new construction probably would have been higher. Offsetting this condition, however, has been the realization that, despite the obstacles, the successful competitor is he who "gits thar fustest with the mostest." Those getting in on the ground floor for Southwestern markets in the last few years realize their plant investments will probably require a longer than normal payout period, but they have had the advantages of relatively low contract prices for raw materials, notably natural gas, and ready markets for their products. Gas prices are on the way up, of which more will be said later. Markets for some chemicals in the Southwest are easing if not definitely uneasy.

In a good many respects the spread of the Southwestern chemical industry since the war is being catalyzed by the same conditions that accelerate the growth of a city blessed with proximity to natural resources, good transportation, increasing markets in the area and the determination to expand. When the basic advantages are present, when growth begins in one way or another, when industries begin moving in, when city agencies begin to encourage the movement, expansion is accelerated. Population rises, employment mounts, local income increases, demand for manufactured goods expands —and the attraction for new industries begins to intensify.

Building slows, but continues

Despite the heavy postwar expansion of chemical plants in the Southwest, which is slackening off, new construction continues. This is to be expected. Reasons: growth of population, growth in per capita income, expansions in chemical-consuming industries, prospects for a regional steel industry, outlook for more regional production of aluminum, continued research and development in the petrochemicals field, and the local availability of raw materials. Given these incentives, expansion is inevitable.

The Gulf Coast continues to hold the spotlight in new construction, as it has since the war. In Louisiana, Mathieson Chemical Corp. at Lake Charles, making ammonia, caustic soda and soda ash, is likely to manufacture ammonia derivatives there. This belief, supported by a report from the Louisiana Department of Commerce and Industry, is buttressed by Mathieson's recent acquisition of Southern Acid and Sulphur Co., which manufactures sulphuric acid at Bossier City, La., and, in Texas, at Beaumont, Houston and Port Arthur.

Freeport adds oil to sulphur

Also in Louisiana, Freeport Sulphur Co. is completing a $7 million expansion program at its mine at Grande Ecaille. This is a general program to increase the number of sulphur wells and the handling of the larger output. Incidentally, Freeport has gone outside the sulphur business and has recently completed several producing oil wells in St. Martin Parish, La. Plans are under way to develop this field.

Esso goes Oxo

At Baton Rouge it is to be expected that Esso Standard Oil Co., backed by its own large technological and financial resources, and those of Standard Oil Co. (New Jersey), will go further this year into organics derived from petroleum or its gases. Esso announced late last year the first commercial production in this country of iso-octyl alcohol as based on the Oxo process developed in Germany. The company is interested in marketing the product or its derivatives as a plasticizer, anti-foaming agent and wetting agent. Esso is unlikely to stop with the iso-octyl alcohol development. With the wide variety of olefins made available in its refinery the company has a wealth of raw materials to go further into this field.

Celanese Diamond & Du Pont

In Texas, Celanese Corp. of America, which has bought a large new tract of land near its plant at Bishop, will put new products on the market this year. Two months ago a company spokesman said that propionaldehyde and 2-methyl-1,3-pentanediol, now being made on a pilot plant scale, will be produced at Bishop commercially by the end of summer. Pentaerythritol, also, is expected to be made there this year in commercial quantities.

At Houston, Diamond Alkali, entering the petrochemicals field for the first time, will com-

State and Company	Plant Site	Construction Involved	Status
ARKANSAS			
Arkansas Farmers Plant Food	Not chosen	Fertilizer plant	Financing drive begun
Lion Oil	El Dorado	Ammonium sulphate unit	Completion fall 1949
Lion Oil	El Dorado	Expanding ammonia output	Completion summer 1949
Lion Oil	El Dorado	New sulphuric acid unit	Completion fall 1949
LOUISIANA			
Acme Alcohol Products	Lafayette	Fermentation alcohol plant	Completion 1949
Crosby Chemical	De Ridder	Resins, rosin derivatives	Completion 1949
Ethyl Corp.	Baton Rouge	Increase in ethylene dichloride and sodium	Completion 1949
Freeport Sulphur	Grande Ecaille	General expansion of plant	Completion 1949
NEW MEXICO			
Int'L Minerals & Chemical	Carlsbad	Potassium chloride and potassium sulphate	Completion 1949
United States Potash	Carlsbad	Expanding refinery capacity	Completion 1949
TEXAS			
Carbide & Carbon Chemicals	Texas City	Previously announced program	Completion 1949
Carthage Hydrocol	Brownsville	Previously announced program	Construction incomplete
Celanese Corp. of America	Bishop	Additional organic chemicals	Scheduled 1949
Diamond Alkali	Houston	Chlorinated ethylene products	Completion 1949
Du Pont	Victoria	New nylon salts plant	Initial work begun
Hercules Powder	Houston	Ammonia, ammonium nitrate	Completion 1949
Ozark-Mahoning	Monahans	Sodium sulphate expansion	Completion 1949
Phillips Chemical	Etter	Ammonium nitrate unit	Completion 1949
U. S. Industrial Chemicals	Brownsville	Plant to separate Hydrocol chemicals	Under construction

. . . NEW CHEMICAL PLANTS now being planned or scheduled for early completion in the Southwest.

plete in a few months a unit for producing chlorinated ethylene products. Diamond, of course, produces its own chlorine at the plant opened last year. Ethylene is piped in from the Shell plant nearby. Diamond pipes liquid chlorine and caustic to Shell.

Du Pont has already disclosed plans to build a large new plant at Victoria, Tex., to manufacture salts for nylon production. Initial tests of the site are under way, including an exploratory well to determine the feasibility of disposing of certain plant wastes into underground sands.

Not quite decided

A number of companies that either have not made final decisions or have not disclosed them are interested in additional chemical construction along the Gulf Coast. It would not be surprising to see an expansion of the Rohm and Haas plant at Houston based on the pilot plant work the company has been doing at Philadelphia for the production of aldehydes and alcohols via the Oxo process. The Houston plant, now making raw materials for acrylics, is situated in a large petroleum refining center where a variety of olefins are produced.

Engineers of two Houston firms, one a large gas company and the other an engineering organization, have been looking into the practicability of going into petrochemicals production, but as yet these projects are only in the speculative stage. A Houston industrial engineer has been making surveys at Victoria and other Texas localities for a large eastern company that has several plants in Louisiana.

For some time Tennessee Eastman has been looking over the Gulf Coast and inland localities of the Southwest with a view to building a plant manufacturing chemicals from natural gas. Up to six weeks ago no decision had been announced, although Victoria and two communities in Arkansas had received serious consideration.

Oil and gas expansion

With respect to current construction, attention should be given to petroleum refining and a closely related branch—the recovery of liquefied, saturated hydrocarbons from natural gas and casinghead gas. These two groups, although for some purposes not classified as chemical manufacturing enterprises, are related too intimately to those enterprises to be disregarded in this survey.

$60-70 million

Remarks concerning petroleum refining as a consumer of chemicals are made elsewhere in this report. As regards construction in refining, the work under way at present and probably to be completed during the year totals something between $60 million and $70 million. The range covers only processing equipment. Excluded are such related portions of the industry as shops, storage facilities, research and development laboratories, and transportation equipment. The greater part of refining construction is in Texas, and represents equipment for increasing the output of conventional petroleum products such as gasoline, lubricants and heavier fuel oils.

New capacity, who and why

Refining construction in Texas centers in such major plants as Humble Oil & Refining Co., Baytown; Magnolia Petroleum Co., Beaumont; Pure Oil Co., Smith Bluff; and the Texas Co., Port Arthur. In Louisiana, the major refining project slated for completion this year is the $35 million solvent refined lubricating oil unit, the largest such unit in the country, being built at Lake Charles by the Cit-Con Corp.

The American Petroleum Institute considers that 1949 will witness a continued pressure on refineries to push their capacities to the utmost. In view of the importance of refining in the Southwest and opinion of API President W. R. Boyd, Jr., is worth noting: "Refineries throughout the United States will have to operate throughout the year at 97 percent of their January 1949 capacity if the expected demand for refined products is to be met. This will not be easy, and will be accomplished only by the early completion and operation of some of the new refining units now under construction. The refining capacity may reach 6,500,000 bbl. daily by December as the new units go on stream."

The recovery, by natural gasoline plants, of liquefied hydrocarbons from gases produced in the natural gas and oil fields is markedly increasing. Three principal reasons explain this: (1)

Mineral Resources of the Southwest. These form the bedrock on which the region is building its boom

Minerals Production in Arkansas

	1939	1946	1947	1948
Natural gas, billion ft.	19	50	64	74
Petroleum, crude, million bbl.	21	28	30	33
Limestone, 1,000 tons, crushed	64,700	231,700	818,200	756,900
Sulphur, long tons	none	?	?	?
Glass sand, tons	76,800	191,800	188,600	127,100
Bauxite, tons, wet	437,300	1,318,900	1,486,700	1,853,700
Lead ores, tons	neg.	neg.	neg.	neg.
Zinc ores, tons	120	4,300	neg.	neg.
Barite, tons	2,800	289,000	277,000	298,000
Rutile, tons	4,500	none	none	none

Source: Arkansas Resources and Development Commission, Little Rock. Estimated: all 1948; rutile 1939 is estimated production of concentrates 1932–1943.

Minerals Production in Louisiana

	1939	1946	1947
Natural gas, billion ft.	285	602	839
Petroleum, crude, million bbl.	94	130	167
Salt, tons	1,097,700	2,194,798	2,216,247
Limestone, 1,000 tons	neg.	neg.	neg.
Sulphur, long tons	422,600	844,170	880,000

Source: State of Louisiana Dept. of Commerce and Industry, Baton Rouge.

Minerals Production in New Mexico

	1939	1946	1947	1948
Natural gas, billion ft.	60	126	132	152
Petroleum, crude, million bbl.	38	37	41	47
Salt, tons	.....	8,700	10,000	10,000
Limestone, 1,000 tons	?	?	?	?
Lead, tons	5,392	4,909	5,573	5,053
Zinc, tons	29,356	36,103	48,747	37,004
Copper, tons	46,142	50,191	58,396	70,402
Gold, oz.	36,979	4,000	3,079	3,601
Silver, oz.	1,400,878	336,000	373,412	491,018
Potash, tons ore	1,000,000	4,309,600	4,449,400	4,846,300
Molybdenum, tons	625	549	549	702
Fluorspar, tons	.....	17,000	13,000	29,500

Source: State Bureau of Mines, Socorro, N.M. Estimated: salt 1947 and 1948, potash 1939.

Minerals Production in Oklahoma

	1939	1946	1947
Natural gas, billion ft.	258	331	393
Petroleum, crude, million bbl.	136	135	141
Salt, tons	small	small	small
Limestone, 1,000 tons, mainly aggregate	1,312	3,413	2,610
Glass sand, tons	50,000	150,000	.....
Lead, tons, metal	21,240	13,697	14,289
Zinc, tons, metal	162,935	69,552	51,062

Source: Oklahoma Geological Survey, Norman, Okla. Estimated: glass sand 1939 and 1946; estimate for 1948 is 175,000 short tons.

Minerals Production in Texas

	1939	1946	1947
Natural gas, billion ft.	979	1,776	1,933
Petroleum, crude, million bbl.	483,528	780,215	819,427
Salt, tons	39,096	.....	.....
Limestone, 1,000 tons	3,168,350	2,446,170	?
Sulphur, long tons	1,665,785	2,975,472	?
Glass sand	?	?	?
Coal, net tons, excl. lignite	16,259	lignite only	lignite only
Lead ores, tons	227	47	78
Zinc ores, tons	none	44	22
Lime, tons	62,048	121,841	?

Source: Bureau of Mines.

constantly rising sales of liquefied propane and butane as fuels in rural communities; (2) demand for such products, including heavier condensables, as components of gasoline; (3) their increasing value as raw materials for the manufacture of petro-chemicals.

At the beginning of this year, natural gasoline plants under construction in Texas were designed to process a total of approximately 1.5 billion cubic feet per day of raw gas. Most of the construtions is scheduled to be completed during 1949. Comparable figures for new natural gasoline plant construction in Oklahoma and Louisiana were about 0.4 billion and 0.3 billion respectively. Similar construction in Arkansas and New Mexico was relatively minor.

Gas bomb

During 1949 and 1950 it is probable that the recovery of liquefied hydrocarbons in the petroleum gases produced in Texas is going to increase at a rate higher than the expected increases in total gas production. Late last year the Texas Railroad Commission, arbiter of the oil and gas industry in the state, dropped a time bomb of atomic proportions into the laps of producers operating around 20 oil fields. The commission moved to close those fields where "excessive" losses of casinghead gas (estimated at a total of 300 million cubic feet per day) were reported. Injunction suits have flooded the courts. In February the Texas supreme court in its first action in the controversy, held that the Railroad Commisison was within its authority in closing one field, but the majority opinion emphasized that the decision in connection with that field in no way closed the door to appeals pending in reference to the other affected fields. This whole situation is explosive and bears watching.

Texas has the largest reserves, and produces annually the largest amounts of marketed natural gas, in the country. In January a top official of Humble Oil and Refining Co., estimated that $250 million is being spent in Texas in the postwar conservation of gas. Of this figure about 40 percent has been expended and another 40 percent will be invested during 1949.

Raw materials

For many years prior to the last war the unparalleled raw material resources of the Southwest were consumed principally by chemical companies using such materials in plants outside the region. An exception was the refining of petroleum, which was and continues to be centered in the territory. Another exception was natural gas, which, up to the war, was primarily consumed in the Southwest as gaseous fuel or partially liquefield to recover its heavier, easily liquefied components for use as domestic fuels or gasoline.

When the blow fell on the United States in December, 1941, the conditions that were to shift chemical manufacturing toward the Southwest were realized and decisions were made quickly. Eastern manufacturing regions were concentrated and offered tempting targets. Plant capacities were taxed, room for expansion was nonexistent or limited. Tankers were being sunk, curtailing the supply of petroleum to refineries along the Atlantic. Natural rubber ceased arriving from the East. These facts, and the subsequent construction of chemical plants, largely government-financed, in the Southwest, are an

Growth of Electric Power in the Southwest

	1939	1946	1947	1948
Total Power Capacity, kw.				
Arkansas	189,935	225,715	256,315	258,211
Louisiana	525,334	541,983	645,177	692,687
New Mexico	146,929	160,157	178,924	187,797
Oklahoma	413,900	471,877	533,517	563,905
Texas	1,315,782	1,494,000	1,580,061	1,779,182
Total U. S.	49,433,105	50,316,621	52,322,007	54,968,075
Total Power Generated, 1,000 kwh.				
Arkansas	236,712	637,306	917,116	1,027,422
Louisiana	1,881,563	2,853,755	3,982,379	4,393,730
New Mexico	281,506	2,488,076	760,360	820,698
Oklahoma	1,108,369	2,009,109	2,347,606	2,664,851
Texas	2,731,984	7,338,627	8,393,293	9,677,173
Total U. S.	127,641,804	223,177,783	255,738,984	282,804,459
Power Generated, Industrial Purposes Only, 1,000 kwh.				
Arkansas	64,391	617,833	875,807	983,814
Louisiana	491,808	1,949,183	1,334,282	1,748,874
New Mexico	112,492	230,779	212,965	223,889
Oklahoma	200,689	197,783	210,409	228,909
Texas	861,055	2,763,386	3,233,527	3,636,137
Total U. S.	33,666,683	46,430,941	51,661,409	53,741,019

Source: Federal Power Commission

Per Capita Income in the Southwest

	1939	1946	1947
Arkansas	$246	$701	$710
Louisiana	354	803	892
New Mexico	341	939	1,053
Oklahoma	340	821	930
Texas	401	977	1,128
Total U. S.	539	1,213	1,323

Source: Economic Almanac for 1949, Dept. of Commerce.

Population in the Southwest

	1939	1947	1948	% Rise, '39 to '48
Arkansas	1,949	1,912	1,925	−1.0
Louisiana	2,364	2,535	2,576	9.0
New Mexico	532	538	571	7.0
Oklahoma	2,336	2,275	2,362	1.0
Texas	6,415	7,060	7,250	13.0
Total U. S.	131,669	144,034	146,114	11.0

Data in thousands. Source: Census Bureau. Estimated: 1947 and 1948; 1939 from 1940 census.

Earmarks of expanding Southwest economy: Growth in income, population and power

old story, but they pushed the region into the industrial era.

Enough for years to come

Despite the draft on resources occasioned by the war, the reserves of natural resources are good for many years. This includes crude petroleum, although the trend of the ratio of annual demand to known reserves has become a matter for some concern. Natural gas reserves, at the present rate of consumption, are estimated conservatively at around 30 years, and new discoveries in the future are likely to prevent that figure from shrinking materially for some time to come. Salt, sulphur, calcium carbonate as limestone and oyster shells, naval stores, and vegetable and animal oils are among the basic materials forming the backbone of chemical manufacturing.

The wealth of natural gas and gases from petroleum refining in the Southwest, coupled with the millions spent in recent years on research and development, has played no small part in the expansion of the chemical industry in the region, which is to a large degree based on petrochemical products. New pesticides, synthetic ethanol, synthetic glycerin, various petroleum-based solvents and new methods of applying fertilizers are developments of the last few years. Others are on the way.

Boon of better earnings

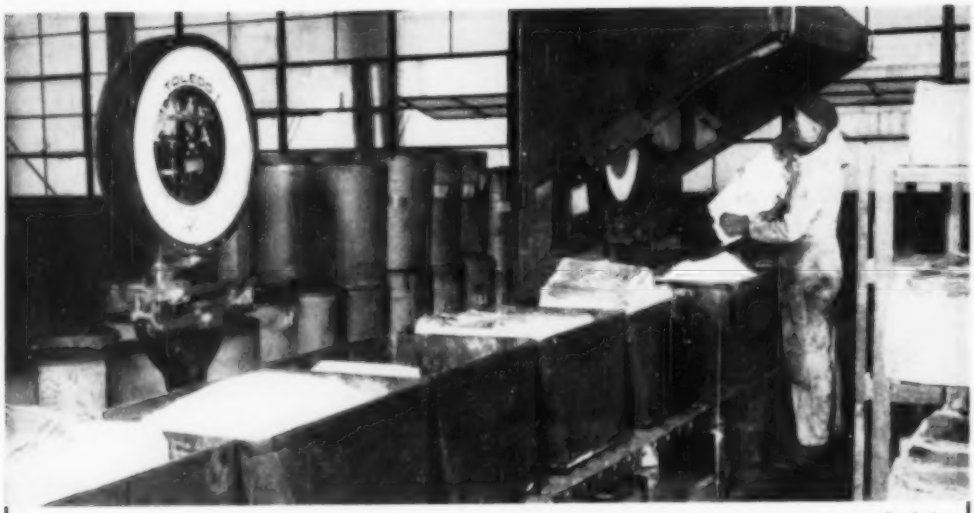
The prospect for better earnings has been and continues to be among the leading reasons for the chemical development of the region. Taking into due account the present excessive construction costs prevalent throughout the country, outlays for many types of plants are reduced because of the relatively small amount of housing required for processing units and power installations in the mild climate. (See, for example, the cover of this issue.)

Signs of growth in local markets

Referring in more detail to the subject of markets, a few general indicators show what has been happening since the war that favors the growth of chemical manufacturing. For one thing, population along the Gulf Coast has expanded. The estimated population of Texas in 1948 was 13 percent higher than the 1939 figure. The comparable increase in Louisiana was 9 percent. The rate of growth in Texas has been more rapid than that of the nation as a whole.

Per capita income has increased materially in all the Southwestern states, as it has throughout the country. In 1947 the highest rates, noted in Texas and Louisiana, approximated the national average.

The large increases in electric power production in the Southwest during the last few years are worthy of note, reflecting as they do a rising standard of living and expanding industrialization on many fronts. Power generated for industrial purposes has increased in the Southwest since 1946 at an appreciably higher rate than it has for the United States as a whole. In 1946, the first postwar year, the total industrial power generation for Arkansas, Louisiana, New Mexico, Oklahoma and Texas was, using round numbers, 5 billion kwh. In 1948 the total had climbed to 6.8 billion kwh., an increase of 36 percent. Industrial power generation for the entire country rose, during the same period, from 46.4



	Fertilizers	Food Processing	Primary Glass	Insecticides, Fungicides	Protective Coatings	Pulp & Paper	Petroleum Refining	Soaps, Detergents	Synthetic Rubber Compounding
ARKANSAS									
No. plants with under 50 employees	6	38	3	3	1	0	0	2	0
No. plants with 50 to 100 employees	1	31	1	0	1	0	3	1	0
No. plants with over 100 employees	0	19	1	0	0	2	4	0	0
	7	88	5	3	2	2	7	3	0
LOUISIANA									
No. plants with under 50 employees	6	43	0	18	12	0	4	12	0
No. plants with 50 to 100 employees	5	20	0	4	2	0	1	1	0
No. plants with over 100 employees	1	37	1	1	3	6	10	1	2
	12	100	1	23	17	6	15	14	2
OKLAHOMA									
No. plants with under 50 employees	...	...	...	...	...	0	0	...	0
No. plants with 50 to 100 employees	...	...	...	...	...	0	3	...	0
No. plants with over 100 employees	...	...	...	...	...	0	12	...	0
	3	73	14	11	9	0	15	5	0
TEXAS									
No. plants with under 50 employees	10	77	1	61	26	0	11	35	0
No. plants with 50 to 100 employees	3	21	1	2	3	0	22	2	0
No. plants with over 100 employees	5	45	3	6	3	3	44	8	6
	18	143	5	69	32	3	77	45	6

Fertilizers: includes dry mixers. Food Processing: exclusive of dairy products. Pulp & Paper: only those mills manufacturing their own pulp.

CHEMICAL CONSUMERS in the Southwest. Amid the clamorous arrival of new chemical producers, an important influx of chemical consumers—like the rubber compounder in the photograph—has gone by largely unnoticed.

billion kwh. to 53.7 billion kwh., an increase of only 16 percent.

Wage scale climbing

Until the last eight years, wage and salary scales for operators, maintenance men, clerical forces and technologists were relatively low. This situation is rapidly passing. Alert management should no longer expect to find large savings in this respect in the Southwest. Unionization of operating and maintenance personnel is general, although a few companies, through generally accepted policies, either have no unions or have only their own well-contented employee organizations. Engineers and chemists of the best qualifications continue at a premium.

Magnetic fuel

As for fuel, one of the items in manufacturing costs, natural gas continues to be an attractive magnet. It is available in large quantities in Texas, Louisiana, New Mexico, Oklahoma and Arkansas. Gas is going up in price, though. Increasingly large volumes are being contracted for on a long-term basis for movement to California and the East. More of this later.

Continuing on the theme of better earnings, the reduced chemical manufacturing costs made possible through technological improvements in recent years favor the Southwest. In older centers of production the existing investments in equipment, and managerial attitudes in some instances, do not encourage expensive process changes promising reduced costs. This condition is supplemented by growing markets in the Southwest and the attractiveness of new plants serving the region at relatively low costs for transportation of raw materials and products

Market data

It is worth mentioning that various organizations in the Southwest are energetically and

efficiently competing for new chemical industries and are gathering increasingly accurate and comprehensive information on their manufacturers, numbers of which consume large quantities of chemicals. Many of their publications are of value in the search for chemical markets, particularly those that show the size of manufacturing companies by listing the number of employees.

Southwest consumers

To name a few of the latest state-wide catalogues of manufacturing industries of all categories, there is the "Directory of Texas Manufacturers," 1947, published by the Bureau of Business Research, the University of Texas, Austin. In Louisiana the state Department of Commerce and Industry, Baton Rouge, has published its "Industrial Directory, State of Louisiana, 1947." The "Oklahoma Manufacturers' Directory, 1948," is available from the Oklahoma Planning and Resources Board, State Capitol, Oklahoma City. The industries of Arkansas are covered in the "Industrial Directory, State of Arkansas," Jan. 1948, published by the Arkansas Resources and Development Commisison, State Capitol, Little Rock. All these with the exception of the Oklahoma directory list the number of employees. Information from these directories form the basis of the accompanying table listing selected groups of chemical-consuming industries.

Petroleum refiners

One of the best known industries of the Southwest, petroleum refining, is one of the largest consumers of chemicals, notably caustic soda, soda ash, sulphuric acid, hydrofluoric acid, silica-alumina and other catalysts, miscellaneous water treating agents, fats, soaps, lead oxide, paints, industrial gases and chlorine. The heaviest concentration of refineries and refining capacity is along the Gulf Coast and centered in Texas and Louisiana. To a large extent the presence of refineries in that region, offering not only inviting markets for such chemicals but also the wide range of hydrocarbons that form the groundwork of petrochemicals manufacturing, has attracted the heavy chemicals industry to the Southwest.

As a whole, refineries continue to operate at capacity and continue to expand. There is no point in elaborating on the fact that the larger plants, such as Esso Standard Oil Co. at Baton Rouge, the Texas Co. at Port Arthur, Pan American at Texas City, Phillips Petroleum at several points, and Lion Oil Co. at El Dorado are tending to move directly or through subsidiaries into the manufacture of petroleum-based chemicals, thereby becoming more attractive as outlets for chemicals required in such enterprises.

Paper industry

The paper industry is another good outlet for chemicals in the region, using large quantities of caustic soda, salt cake, chlorine and calcium hypochlorite. In Arkansas, four companies are in the field; pulp as well as paper is being manufactured by the Crossett Industries at Crossett and by International Paper Co. at Camden. Crossett, last year, built a research and development laboratory designed to serve the company's paper and chemical activities, through reducing wastes, improving quality of products and developing new uses for wood products.

In Texas, an interesting development in 1948 was the start of an experimental effort at the Houston plant of Champion Paper & Fibre Co. to manufacture newsprint. Champion had made no newsprint there previously. In December the plant began making the product on a small scale for a trial by one of the Houston newspapers. The company said in February that, although no plans have been made to establish newsprint on a regular basis at the Houston plant, experimentation will continue. Champion's regular operation involves the production of pulp and finished coated papers from pine and hardwood. The company has moved from its Hamilton, Ohio, plant, equipment designed to increase the output of finished paper at Houston by 25 percent. A year ago, Champion bought over 300 acres of land near Silsbee, in east Texas, but has not disclosed plans for use of the tract.

At Lufkin, Tex., Southland Paper Mills, the plant that demonstrated that newsprint could be made from southern pine, has been increasing its capacity. In April 1948, the plant completed an expansion program that increased its consumption of wood from 450 to the new level of 600 cords per day. Southland makes newsprint and cylinder machine board. In January this year a company official said no new construction is contemplated for this year.

Two Southern projects, although outside the Southwest as covered by this report, should be mentioned because of the certainty they will embody the latest improvements in chemical engineering technology and for that reason will influence the Southwestern pulp and paper industry. One is the large newsprint mill at Childersburg, Ala., being constructed by Coosa River Newsprint Co., probably to be completed next year.

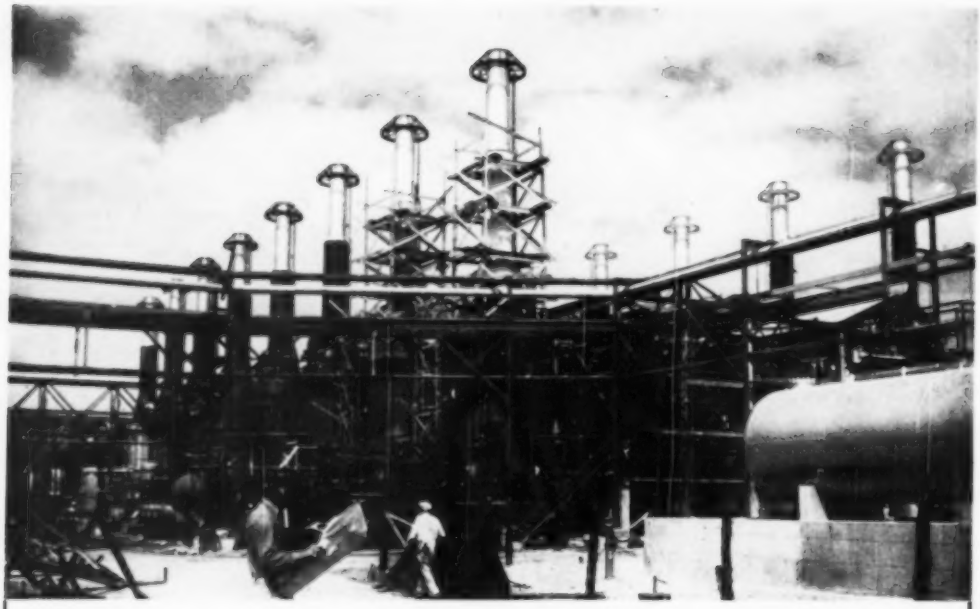
The other, and more revolutionary, project is that which International Paper Co. is expected to start this year at Natchez, Miss. International has announced that for the first time, rayon pulps can be manufactured from hardwoods rather than softwoods, using a modification of the sulphate process. Radical changes are involved in the sulphate process, tending to reduce capital investment and operating costs. Planned output is 300 tons per day. Completion: probably next year.

Glass industry

In response to the growing number of food processing plants in the Southwest and the increasing demand for glass used in industrial and commercial establishments, glass manufacturing has been moving into the region. This is widening the outlet for soda ash, lime, borax, potassium carbonate and lead oxide.

Arkansas has five primary glass manufacturers, though they are relatively small. In Louisiana the big manufacturer is Libbey-Owens-Ford, at Shreveport. In Texas, three glass manufacturing plants with more than 100 employees are listed: Owens-Illinois Glass Co., at Waco; Ball Bros. Glass Co., at Wichita Falls; and Knox Glass Bottle Co., at Palestine.

With large reserves of glass-grade sand, so far relatively unexploited, Oklahoma is pushing the manufacture of glass. The availability of natural gas as a fuel is an incentive. Fourteen



ARKANSAS

American Cyanamid	Little Rock	Bauxite, drying
Consolidated Chemicals	Little Rock	Bauxite, processed
Crossett Chemical	Crossett	Acetic acid, methanol, wood patch
Diamond Alkali	Pine Bluff	Caustic soda, chlorine
Int'l. Minerals & Chem.	Texarkana	Superphosphate and mixed fertilizers
Lion Oil	El Dorado	Ammonium nitrate, anhydrous ammonia, nitrogen solutions, protective coatings
Porocel	Little Rock	Bauxite, activated
Reynolds Metals	Hurricane Creek	Alumina
Southern Acid & Sulphur	Little Rock	Ammonium sulphate, mixed fertilizers, sulphuric acid, superphosphate
Southern Acid & Sulphur	Stange	Sulphur from natural gas
Southern Acid & Sulphur	Magnolia	Sulphur from natural gas

LOUISIANA

Bay Chemical	Weeks	Hydrochloric acid, sodium sulphate
Carey Salt	Windfield	Salt
Commercial Solvents	Sterlington	Anhydrous ammonia, methanol
Commercial Solvents	Harvey	Fermentation alcohol
Commercial Solvents	Westwego	Fermentation alcohol
Consolidated Chemical Industries	Baton Rouge	Sulphuric acid
Consolidated Chemical Industries	Pastrop	Aluminum sulphate, ammonia alum, potassium alum, ammonium sulphate
Crosby Chemical	De Ridder	Naval stores
Esso Standard Oil	Baton Rouge	Alcohols, ethers, other petrochemicals, rubbers
Ethyl Corp.	Baton Rouge	Benzene hexachloride, caustic soda, chlorine, ethyl chloride, ethylene dichloride, hydrogen chloride, sodium, sodium sulphate, oil soluble dyes
Freeport Sulphur	Grande Ecaille	Sulphur
General Chemical	Baton Rouge	Anhydrous HF
General Chemical	Marrero	Alum
General Chemical	West Monroe	Aluminum sulphate, liquid
Gordy Salt	New Iberia	Salt
International Salt	Avery Island	Salt
Jefferson Island Salt	Jefferson Island	Salt
Mathieson Chemical	Lake Charles	Anhydrous ammonia, solid and flake caustic soda, light and dense soda ash
Myles Salt	Iberia Parish	Salt
Newport Industries	De Quincy	Naval stores
Newport Industries	Oakdale	Naval stores
Permanente Metals	Baton Rouge	Alumina
Solvay Process	Baton Rouge	Caustic soda, chlorine, soda ash
Southern Acid & Sulphur	Bosser City	Sulphuric acid
Southern Alkali	Lake Charles	Caustic soda, chlorine
Stauffer Chemical	Harvey	Sulphur
U. S. Industrial Chemicals	New Orleans	Acetone, ethanol, n-butyl acetate, n-butanol, dry ice
Valite Corp.	Lockport	Resins from bagasse

NEW MEXICO

Int'l. Minerals & Chemical	Carlsbad	Potassium chloride, potassium sulphate
Potash Co. of America	Carlsbad	Muriate of potash (2 grades)
United States Potash	Carlsbad	Manure salts, muriate of potash

OKLAHOMA

Cardox Corp.	Claremore	Potassium perchlorate, sodium chlorate
Cities Service Oil	Tulsa	Acetone, acetaldehyde, formaldehyde, methanol
Ozark-Mahoning	Tulsa	Hydrochloric acid, potassium sulphate, sulphuric acid
Thurston Chemical	Tulsa	Superphosphate, mixed fertilizers

(Continued next page)

CHEMICAL PRODUCERS in the Southwest. Photo shows one of them, Monsanto's reconstructed styrene plant at Texas City. Other Texas producers are listed on next page; Texas' list, significantly, is as long as all four of those above.

plants are listed, the largest number in any Southwestern state. The list includes such nationally known firms as American Window Glass Co., Okmulgee; Pittsburgh Plate Glass Co., at Henryetta; and Corning Glass Works, at Muskogee.

Oklahoma agencies estimate that new capital investments in glass making in the state during 1947 and 1948 approximated $7 million. Major expansions centered at Corning Glass, American Window Glass and Pittsburgh Plate Glass.

Pesticide producers

Rapid development of numerous new insecticides, fungicides and other poisons for agriculture, accompanied by extensive publicizing of these crop-savers by various governmental agencies, is providing an attractive outlet for chemicals in the Southwest. The rich agricultural industry of the region struggles incessantly with pests that thrive in the mild climatic conditions prevalent in the area.

Estimates place the national annual agricultural loss through fungi alone at several hundred millions of dollars. Heavy losses also occur through the hundreds of tiny animal pests eating into farm profits.

The manufacture of chemical preparations to fight these scourges is a sizable business in the Southwest. As might be expected, the manufacturers are concentrated in Texas and Louisiana, where there is a combination of large agricultural area and warm, humid weather favoring most agricultural parisites. Texas sources indicate there are about 70 manufacturers in the state, six of which have over 100 employees each. Most of the companies are at Houston, Dallas and Fort Worth. Louisiana has about 25 establishments, one with a staff over 100 employees. The Louisiana companies are centered around New Orleans.

Food industry

Food processing, next door to the farmer, is another chemical consuming industry in the Southwest. Food processors are on the increase. Their requirements are fairly large for chemicals and closely related materials for sterilization, bleaching, preserving and cleansing.

Take a look at Texas, where the number of processors, not including processors of dairy products, is at present around 150. About 50 of these employ over 100 workers each; 21 have a staff of 50 to 100. Around half of the largest concerns are canning citrus juices and vegetables in the lush Rio Grande valley, and several of the big operators are in the vegetable region of northeast Texas.

Turning to food processors in Louisiana, a high percentage of these handle seafoods, and are located around New Orleans and other coastal towns. Of the 37 companies in the state with more than 100 employees each, 18 are processing seafoods. Approximately 25 companies, all sizes, are manufacturing flavors, most of them at New Orleans.

Arkansas has about 90 food processors. The state has a big business in this line, 19 of the manufacturers having a staff of over 100 each. Almost all this industry is in the northwestern part of the state, where farming is concentrated. Products are fruits and other vegetables.

As to Oklahoma, the state has over 70 processors, scattered throughout the state. Facts as to sizes of establishments are not available.

Soap makers

Soap manufacture is another industry based on the animal and vegetable resources of the Southwest and furnishes outlets for caustic, soda ash, sodium silicates and other chemicals in lesser quantities. A leading area of cattle country, Texas has the largest number of soap makers, including the largest number employing more than 100 workers. Dallas, Houston and Fort Worth are focal points for soap manufacturing. Several national firms like Procter & Gamble, Swift & Co. and Armour & Co. have plants in the state. Louisiana is second in number of soap plants, most of which are located around New Orleans. The industry is relatively small in Arkansas and Oklahoma.

Rubber

The war-born industry of synthetic rubber shows increasing evidence that it will remain a good consumer of such Southwestern raw materials as butadiene, styrene, isoprene and carbon black. The best token of this is the continuing research leading to improved types of rubbers superior for specific uses to the natural product. Particularly noteworthy has been the development of low-temperature "cold" rubber and carbon blacks furnishing in combination a rubber for tire treads markedly superior both to natural rubber and standard GR-S. By the end of 1949 it is expected that about 200,000 long tons per year of government-owned rubber compounding capacity will have been converted to cold rubber production. Several months ago the Office of Rubber Reserve said cautiously that it is too soon to estimate the effect of the development of this type of rubber on the future consumption ratio of natural to synthetic rubber. However, the demonstrated performance of the new product seems convincing enough virtually to assure the continuation of rubber manufacture in the Southwest.

Natural gas is key to future

As to the outlook for continued growth of the chemical industry in the Southwest, it is worth glancing at natural gas. At present there is no immediate worry about such commodities as lime, salt, sulphur and crude petroleum. Although the rate of production and the rate of discoveries of additional reserves of petroleum bear a relationship that is not too happy, it is natural gas that must be watched. Natural gas, both as a fuel and as a source of raw materials for the manufacture of petroleum-based chemicals, is the bedrock of chemical activity in the region. From this product are derived the chief chemicals produced in such major plants as Celanese at Bishop, Shell Chemical at Houston, Carbide & Carbon at Texas City, Jefferson Chemical at Port Neches, Du Pont at Orange, and Dow at Freeport.

Gas, as the scramble for it by transcontinental pipeline companies has intensified, has risen in price. Several years ago, its price at the well ranged between 3.0 and 4.0 c. per M cu. ft. in Texas, Louisiana, and Oklahoma. Today, along the Gulf Coast, it ranges, at the well, from 8.0 to 10.0 c.

A few large owners of gas reserves in Texas are known to be sitting on their holdings in a



TEXAS

American Cyanamid	Fort Worth	Cracking catalyst
Arizona Chemical	Broomfield	Sodium sulphate
Carbide & Carbon Chemicals	Texas City	Acetic acid, acetone, acetic anhydride, acetylene, butanol, butyl acetate, ethylene oxide, ethylene glycol, ethylene amines, ethyl ether, ethylene dichloride, ethyl acetate, isopropanol, isopropyl acetate, methanol, trichlorethylene, Prestone, Vinylite resins
Celanese Corp. of America	Bishop	Acetaldehyde, acetic acid, acetone, formaldehyde, methanol, n-propanol, mixed butyl alcohols, methylal, special solvents
Consolidated Chemical Industries	Houston	Bone char, sulphuric acid
Consolidated Chemical Industries	Fort Worth	Hydrochloric acid, potassium sulphate, sulphuric acid
Diamond Alkali	Houston	Caustic soda, chlorine
Diamond Alkali	Dallas	Sodium silicates
Dow Chemical	Freeport	Carbon tetrachloride, caustic soda, chlorine, ethylene, ethylene dichloride, ethylene glycol, hexachlorethane, hydrochloric acid, magnesium chloride, perchlorethylene, styrene
Du Pont	La Porte	Acetic anhydride, benzene hexachloride, phenothiazine, Fermate, Zerlate
Du Pont	Orange	Adipic acid, hexamethylene diamine, methanol, polythene
Du Pont	Stanton	Nitroglycerine
Duval Texas Sulphur	Orchard	Sulphur
Fleming, J. R.	Weatherford	Tannin, oil, etc., from pecans
Freeport Sulphur	Freeport	Sulphur
Frontier Chemical	Denver City	Caustic soda, chlorine, hydrochloric acid
Gulf Chemical	Houston	Phosphoric acid, calcium phosphates, sodium phosphates
Imperial Salt	Houston	Salt
Jefferson Chemical	Port Neches	Ethylene oxide, ethylene glycol, other petrochemicals
Jefferson Lake Sulphur	Newsville	Sulphur
Jefferson Lake Sulphur	Brazoria	Sulphur
McCarthy Chemical	Winnie	Acetaldehyde, formaldehyde, methanol
Monsanto Chemical	Texas City	Styrene
Morton Salt Co.	Grand Saline	Salt
Nyotex Chemical	Houston	Aluminum chloride, hydrofluoric acid, lime
Ozark Mahoning	Moonshane	Sodium sulphate
Phillips Chemical	Ester	Anhydrous ammonia
Phillips Chemical	Houston	Ammonium sulphate
Rohm & Haas	Houston	Acetone cyanhydrin, ethylene cyanhydrin
Shell Chemical	Houston	Acetone, acrolein, allyl alcohol, allyl chloride, diallyl ether, diallyl phthalate, dichlorohydrin, ethyl chloride, ethanol, glycerine, hexylene glycol, mesityl oxide, methyl isobutyl ketone, methyl isobutyl carbinol, methyl ethyl ketone, epichlorohydrin, secondary butanol, trichloropropane
Southern Acid & Sulphur	Houston	Ammonium phosphate-sulphate, ammonium sulphate, sulphuric acid, superphosphate, processed sulphur
Southern Acid & Sulphur	Beaumont	Sulphuric acid
Southern Acid & Sulphur	Port Arthur	Sulphuric acid
Southern Alkali	Corpus Christi	Caustic soda, caustic potash, chlorine, dry ice, soda ash, lime
Stanton Chemicals	Corpus Christi	Aromatic hydrocarbons and derivatives
Stauffer Chemical	Freeport	Sulphur, sulphur insecticides
Stauffer Chemical	Wesaco	Sulphur, sulphur insecticides
Texas Gulf Sulphur	Liberty	Sulphur
Texas Gulf Sulphur	New Gulf	Sulphur
United Salt	Hockley	Salt

Not included are plants making the following products: cement, glass, pulp and paper, steel, synthetic rubber, conventional petroleum products, industrial gases, aluminum, magnesium, mixed fertilizers, grain products, oils and fats, and small chemical specialties.

CHEMICAL PRODUCERS (CONTINUED). Du Pont operates gas reformers night and day producing methanol at Orange, Texas. But the need for tremendous production effort is diminishing, and the list of petrochemical producers will grow more slowly.

chess game where present taxes and prospects for future higher prices are pieces on the board. Right now, these companies are not particularly hard pressed for the revenue. Up to several months ago there was a limiting factor in the supply of gas that is becoming somewhat less of a problem: the shortage of line pipe. Gas companies that have been disposed to sell their products have had considerable trouble securing the pipe necessary for additional movements. One large company in the vicinity of Houston look for a more generous supply of pipe this year.

Gas prices up

The outlook is for natural gas prices to continue their upward climb, although not at an alarming rate. Gas will continue to be taken out of the Southwest by transcontinental lines in increasing quantities. This movement has played an important part in price increases in the last few years and will continue to be felt. At what point the price of gas would become a critical factor in further expansion of chemical operations in the region is a matter of pure speculation, depending as it must on such elements as future prices for products, extent of markets and technological improvements in manufacturing processes that are probably to come.

Advancing price is, in itself, a spur to developments tending to increase the supply of gas, such as expenditures for conservation measures and the search for additional gas reserves. In the last eight years many plants have been built to recover easily liquefiable hydrocarbons that in former years were merely burned along with the rest of the gas as fuel. Many more such plants are being built today. The drive instituted by the Texas Railroad Commission last year to reduce the loss of gas in oil fields has already been mentioned. It is probable that in the near future the heavy losses of gas, that have ranged from approximately 20 to 25 percent of the marketed production, will be materially reduced by regulatory actions and the added inducement to cut losses that advancing prices have to offer.

Water and waste

During the next few years the questions of water supply and stream pollution must be seriously considered by chemical manufacturers and consumers of chemicals in the Southwest. This applies particularly to Texas. The intense industrialization of Texas beginning with the last war has drawn upon the water supplies of that state at a rate which is now receiving attention by state and local governmental agencies and private industry. At the same time the problems of stream and atmospheric pollution have to be considered.

How dry is Texas

In Texas the era of relying on ground water for industrial and municipal supplies is rapidly passing. The heavy drain on ground water around such industrial centers as Houston, Texas City and Corpus Christi has become such that steps have been or will soon be taken to supplement the ground water supply with surface water. There is plenty of surface water moving through the rivers of Texas; the trouble is, most of it—about 80 percent—drains down to the Gulf unused because of an inadequate system of dams and reservoirs.

Last year in Texas, the critical supply of ground water was materially eased at Texas City when a canal to bring water from the Brazos river to that locality was completed.

At Corpus Christi, farther down along the Texas Gulf Coast, the water supply situation has become serious. One of the promotion agencies in Corpus Christi announced early this year that "in discussing Corpus Christi's industrial prospects, an impasse has been reached in many instances when the subject turned to the industrial water supply." Officials of the local Chamber of Commerce are convinced that several large industrial companies have recently turned down the city as a location for new plants because of this situation.

Water for Houston

It's in the cards that Houston, long dependent on ground water, is going to bring in more water from the rivers without much more delay. Houston now gets a small amount of water from the nearby San Jacinto river. For several years the city, center of the petrochemicals industry on the Gulf Coast, has contemplated the construction of a large reservoir on the San Jacinto sufficient to supply the industrial and municipal needs of the locality for many years. Some of the land on the site of the projected reservoir has been bought, but so far, funds are insufficient for completion of the work. In view of Houston's past record in making a port out of the inland community, and considering the energetic bids the city is making for more chemical plants, it is a safe bet that Houston will bring in the water in the near future.

Concerted action

The Texas state government, cities and industries have been waging a campaign to bring the water question to the attention of the public and to the state legislature particularly. During last year the governor held a series of meetings over the state to discuss the question of water supply, conservation and pollution.

Several bills dealing with water have been introduced into the Texas legislature this spring, dealing with both surface and ground water. At the time this is being written it is too early to predict the outcome of the several bills. One or two have produced sharp controversies among localities and among industrial competitors for water. Corpus Christi hopes to obtain from the legislature the creation of a Lower Nueces River Water District, that would result in the construction of another dam on that river.

Arkansas water problem

In Arkansas the water problem is also attracting attention. A bill introduced into the Arkansas legislature in February, and supported by the governor and the state Resources and Development Commission, would give the state extensive control of its surface waters for the first time in its history. The measure would vest in the Resources and Development Commission authority to arbitrate claims on surface water and to write its own regulation. However there is little prospect that the bill will pass this session of the legislature, in view of heavy opposition by farmers.

Drafts on the ground water supply of Arkansas have been bothering certain localities. Last May was published a ground water survey in the El Dorado area made cooperatively by

the U.S. Geological Survey, the city of El Dorado and the University of Arkansas. Large users in the El Dorado vicinity include Lion Oil Co., Root Petroleum Co., Arkansas Power and Light Co., and the municipalities of El Dorado, Smackover and Norphlet. There are no large rivers in the vicinity. Ground water levels were found to be declining at such a rate as to lead to the recommendation that every possible means of conservation, such as use of cooling towers, should be employed.

Oklahoma is also concerned with the conservation of water. Last year, several of the larger cities where industrial expansion has been occurring increased their water supplies in anticipation of enlarged demands. Late in 1948 was organized the Oklahoma Water Development Association under the managership of Don McBride, formerly chairman of the state planning and resources board. Purpose of the new group is to further completion of water storage, flood control and irrigation projects over the state. A three-year operating budget was set at $90,000.

More metal for Southwest

As the general trend toward industrialization of the Southwest continues, it is likely that the number and scope of operations of metal working establishments serving industries in the region will expand. Such companies that have been operating there for many years primarily to meet the requirements of the oil industry are in many instances competing strongly today for the business of chemical manufacturers.

Primary steel

A development that would greatly encourage the establishment of new metal working plants and foster the expansion of existing concerns would be the emergence of a large and economically healthy primary metal industry, particularly steel. Nuclei for steel manufacturing already exist at Daingerfield, Tex., about 130 mi. east of Dallas, where Lone Star Steel Co. manufactures pig iron, and at Houston, where Sheffield Steel Co. has the only fully integrated steel plant in central United States.

Both plants are expanding. Sheffield, which last December acquired the 700-ton blast furnace at Houston and iron ore leases and beneficiating plants in east Texas, has also acquired coal rights in Pittsburgh County, Okla., from the Interior Dept. The company plans to complete two additional open hearths by June this year and additional finishing facilities by June 1950. Its steel products are marketed in Texas, Oklahoma and Louisiana.

Lone Star Steel applied in January for a $65 million loan from RFC to expand its plant at Daingerfield and install several open hearths and steel finishing equipment. The company owns and operates the blast furnace and byproduct coke ovens (78 Koppers), bought from War Assets last July. The contemplated new additions will not come into operation before next year. Iron ore is taken from deposits in east Texas and beneficiated. Coal comes from east Texas and company mines in Oklahoma.

It will be interesting to watch henceforth what is to come in the way of developments affecting Southwestern steel making. When this was being written the outcome of pending legislation in Washington that was sparked by the Supreme Court's controversial decision on basing point pricing last year was too uncertain to make a safe guess. Also, as the price of steel, once the backlog of deferred construction and the present construction program begin to ease, comes up against a buyer's market, it's going to be a nice problem in economics as to whose raw materials costs, processing costs and transportation costs will permit whom to prosper in the competition for business in the Southwest.

Primary aluminum

As to primary aluminum, products of which are being used increasingly in chemical manufacturing, the biggest development occurred last summer when Aluminum Co. of America announced its decision to build on the Gulf Coast near Port Lavaca, Tex., a $25 million reduction plant. Output will begin either next year or in 1951. Alcoa's plans are to process alumina produced at the company's Mobile, Ala., plant.

From present indications, more primary aluminum will be made this year in Arkansas, where Reynolds Metals Co. has been operating the Jones Mill reduction plant at about half capacity because of lack of electric power. Contracts have been signed to furnish the needed additional power, a development estimated to step up the output of metal to nine million lb. per month. Output is expected to be further increased this fall. As a result of the arrangement, supported by federal government agencies, a substantial portion of the output will be in the form of aluminum wire for rural electrical cooperatives in the region.

At Baton Rouge, Permanente Metals Corp. operates an alumina plant. The company is reported to have tentative plans to install reduction facilities there, but was silent in February as to any decision on the matter.

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A CHEMICAL ENGINEERING PICTURED FLOWSHEET

Barium Chemicals

Article on page 90

The barium chemicals plant of the Chemical Products Corp. is located at Cartersville, Ga. The plant is within 300 miles of its primary source of raw materials, other than barite, which is within short truck hauling distance. Products include barium carbonate, barium chloride, sodium sulphide, ammonium sulphide, monochlorobenzene, orthodichlorobenzene and paradichlorobenzene.

Barite ore is treated with coal in a reduction kiln. The hot black ash goes to leaching tanks where it is mixed with water and steam. The decanted solution goes to storage for use in production of barium carbonate, while the slurry from the leaching system is pumped to storage for manufacture of barium chloride.

In production of free-flowing grade of barium carbonate, barium sulphide liquor is treated with flue gas in an absorber. The carbonated slurry is filtered and dried.

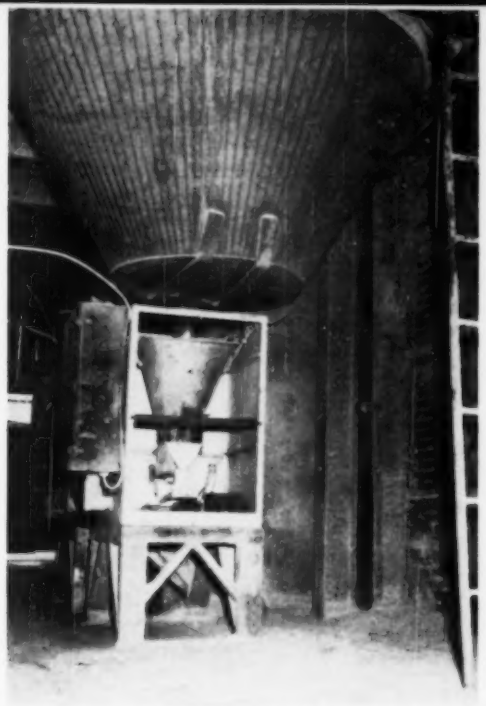
The sulphur-free type of carbonate is precipitated by adding soda ash in dry form to hot barium sulphide solution.

Sodium sulphide liquor from storage is evaporated in two stages. This solution is settled and pumped to storage. It is converted into flakes and packaged.

In the production of barium chloride the thickened slurry is treated with HCl. Barium sulphide solution is added. After the reaction is completed it is filtered, and washed. The solution is evaporated and purified. All sulphur compounds are converted to soluble sulphate. Hot solution is settled and stored. It is next filtered, crystallized and dried.

In the first part of the barium chloride process, where the barium sulphide is reacted with HCl, very pure hydrogen sulphide is liberated. This gas reacts either with aqueous ammonia or sodium sulphide solution to form ammonium or sodium sulphhydrate respectively. The solution from the absorber, once the hydrogen sulphide content has been adjusted, is pumped to storage for packaging.

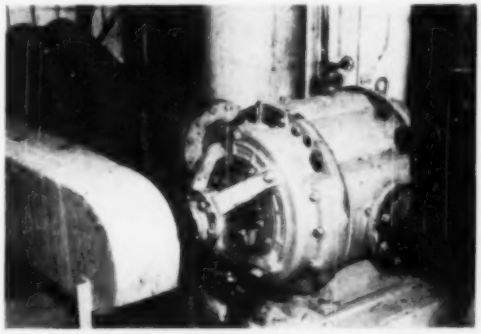
The plant secures its HCl for barium chloride by chlorination of benzene in a conventional manner. Chlorination is carried to a point of high dichlorobenzene content, using iron filings as a catalyst.



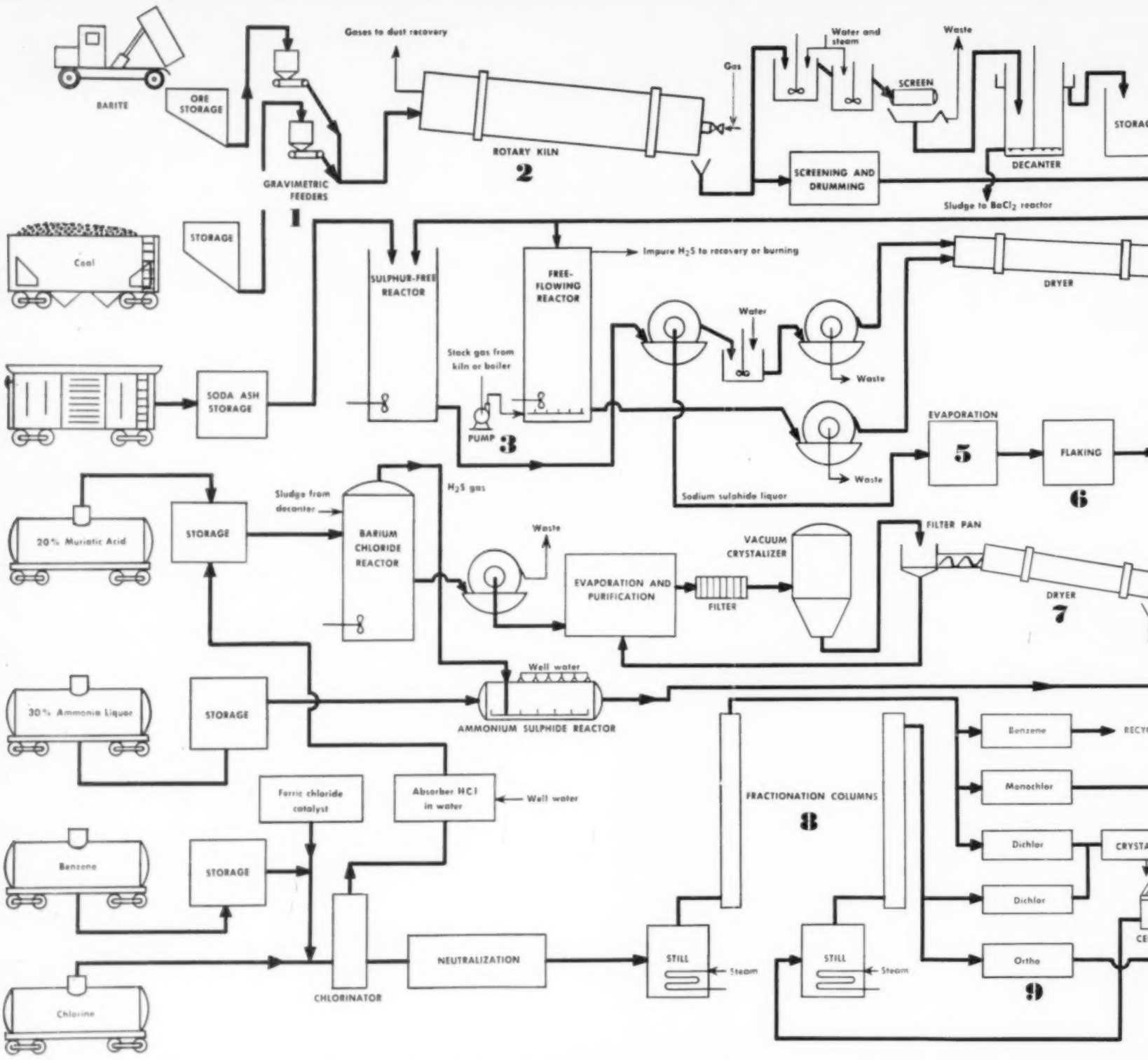
1 GRAVIMETRIC UNITS feed barite ore from bins to bucket elevators where it is mixed with crushed coal.

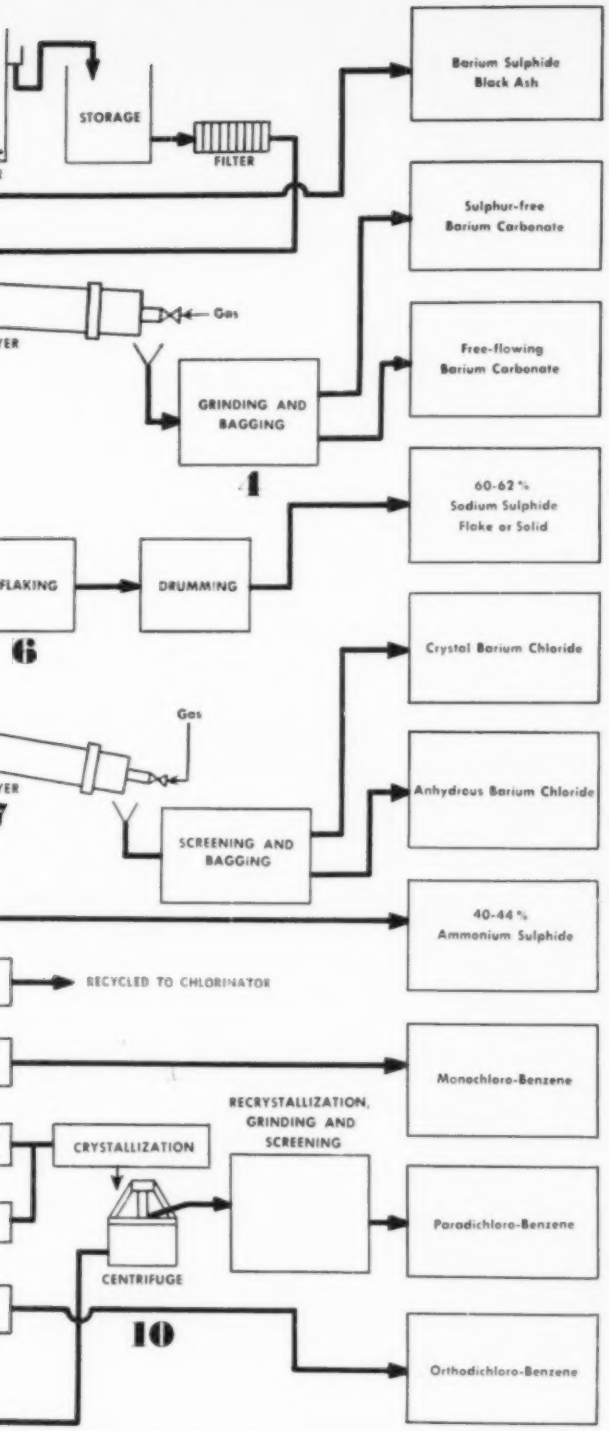


2 KILNS reduce barite continuously. Ore and coal are fed into the rear of kiln and travel counter to heat supply.



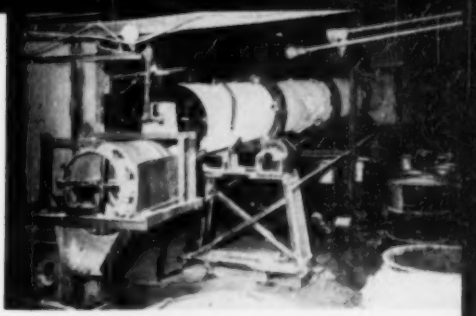
3 PUMPS force flue gas from the boilers into the barium sulphide liquor for precipitation of carbonate.


BARITE
ORE STORAGE
GRAVIMETRIC FEEDERS
1
Gases to dust recovery
ROTARY KILN
2
Gas
Water and steam
SCREEN
Waste
DECANTER
SCREENING AND DRUMMING
Sludge to $BaCl_2$ reactor
Coal
STORAGE
SULPHUR-FREE REACTOR
FREE-FLOWING REACTOR
Impure H_2S to recovery or burning
DRYER
Water
Waste
Stack gas from kiln or boiler
PUMP
3
SODA ASH STORAGE
EVAPORATION
5
FLAKING
6
Waste
Sodium sulphide liquor
20% Muriatic Acid
STORAGE
Sludge from decanter
BARIUM CHLORIDE REACTOR
H_2S gas
Waste
EVAPORATION AND PURIFICATION
FILTER
VACUUM CRYSTALIZER
FILTER PAN
DRYER
7
30% Ammonia Liquor
STORAGE
Well water
AMMONIUM SULPHIDE REACTOR
Ferric chloride catalyst
Absorber HCl in water
Well water
FRACTIONATION COLUMNS
8
Benzene
Monochlor
Dichlor
Dichlor
Ortho
9
Benzene
STORAGE
Chlorine
CHLORINATOR
NEUTRALIZATION
STILL
Steam
STILL
Steam





1 VALVE BAG packaging machine automatically packs free-flowing and sulphur-free barium carbonate into bags.



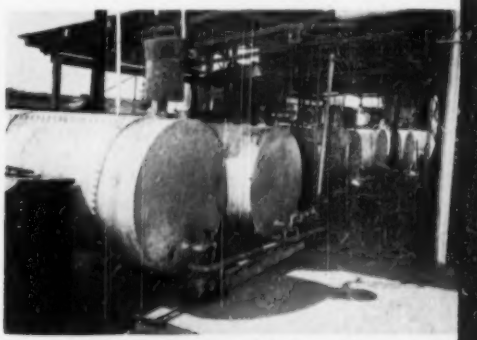
7 ROTARY DRYER for anhydrous barium chloride is followed by screening.



8 FRACTIONATING COLUMNS separate monochlorobenzene and dichlorobenzene.



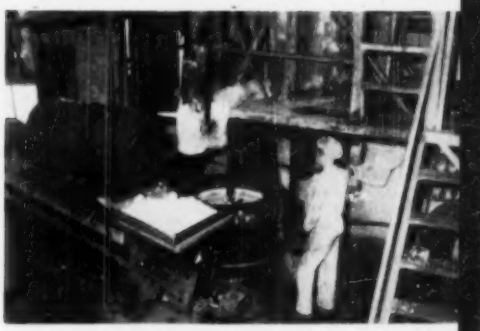
5 FUSION POTS are used for the second stage of the evaporation of sodium sulphide. Direct gas firing is used.



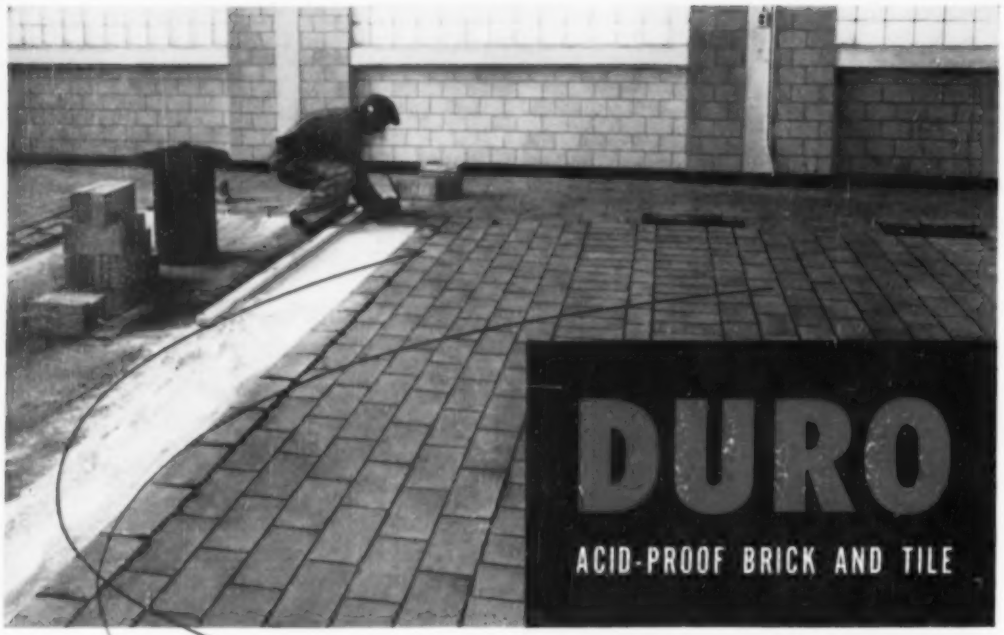
9 STORAGE TANKS contain the paradichlorobenzene and orthodichlorobenzene.



6 FLAKER dries and flakes sodium sulphide. It is then packed into steel drum for shipment.

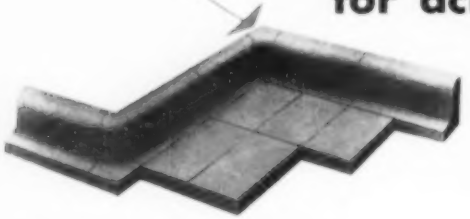


10 CENTRIFUGE separates ortho and para-dichlorobenzene. Mother-liquor is stored.



made by HARBISON-WALKER

for acid-resistant structures



H-W Duro Floor and Cove Tile are shown above. In addition to Standard 9" and 12" sizes, Duro is furnished in many special designs for chemical plant service, some of which are shown below.

TYPICAL SHAPES IN DURO



For chemical plant floors, tanks, towers and other structures exposed to damage by acid and other corrosive liquids and gases, use Harbison-Walker DURO Acid-Proof Brick and Tile.

Duro Brick and Tile are so dense and non-absorbent that there is practically no penetration by acids or other corrosive chemicals. The materials from which Duro are made are insoluble in acids and resistant to moderately concentrated alkaline solutions. Duro are well adapted for use at acid tower temperatures, and have high mechanical strength.

We will gladly send you an illustrated bulletin giving complete data, and showing many standard and special shapes.

Harbison-Walker Refractories Company

AND SUBSIDIARIES

WORLD'S LARGEST PRODUCER OF REFRACTORIES

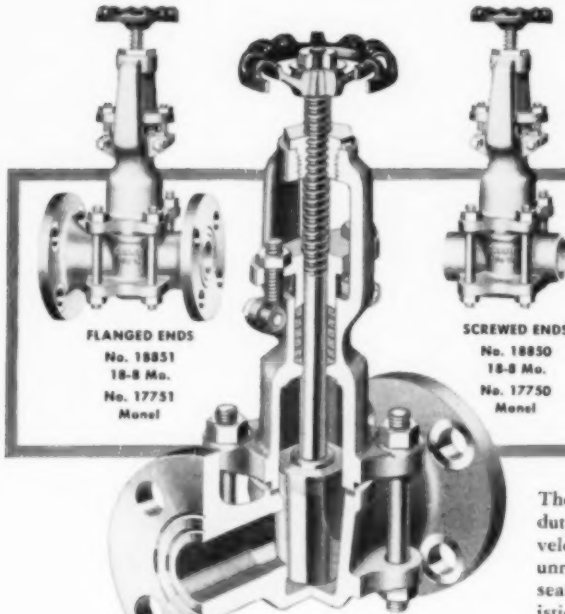


GENERAL OFFICES PITTSBURGH 22, PA.

Trade Mark Reg. U. S. Pat. Off.

Another Stan

in the CRANE





IN SIZES 2½ TO 6 IN.
Crane offers a companion line of corrosion-resistant gates and globes. Working pressure: 150 pounds, liquid or gas. Made in all 18-8 Mo or all Monel. Flanged ends. Swing check valves available in sizes ½ to 6 inches.



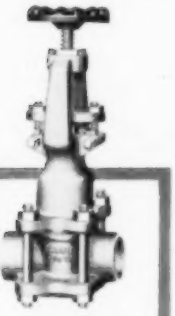
EVERYTHING FROM . . .

VALVES
FITTINGS
PIPE

CRA

Standout—

RANE Corrosion-Resistant Line



SCREWED ENDS
No. 18850
18-8 Mo.
No. 17750
Monel

Double Duty Plug Gate Valves

IN 18-8 MO OR MONEL

WORKING PRESSURE:
150 pounds, gas or liquid
Sizes: ½ to 2 in.
Flanged or screwed ends



These new Crane Plug Gate Valves perform double duty with equal efficiency—as globes, for high or low velocity throttling—as gates, for straight-through, unrestricted flow. Their unique circular plug disc and seating design combines the best service characteristics of conventional gate and globe valves.

In wide-open position, flow discharge is equal to that of a wedge gate valve. In throttling, resistance to cutting equals that of plug type globes. They will not stick even when closed while hot, opened when cold. Galling is eliminated.



In addition to dual-purpose utility, these valves offer famous Crane Quality in construction and materials. All parts in contact with flow are 18-8 Mo or Monel, the most versatile of common corrosion-resistant alloys. Ask your Crane man about these Plug Gates, or **write for Catalog No. 320,** describing them fully.



CRANE CO., 836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas

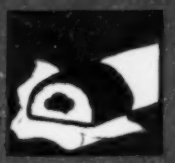
CRANE

PLUMBING
AND
HEATING

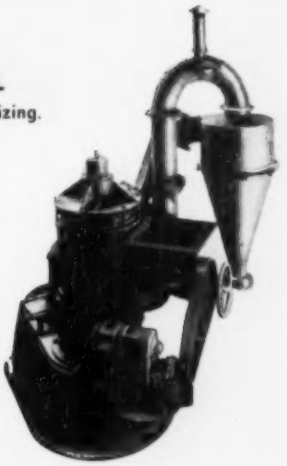
FOR EVERY PIPING SYSTEM



Fine FOODS



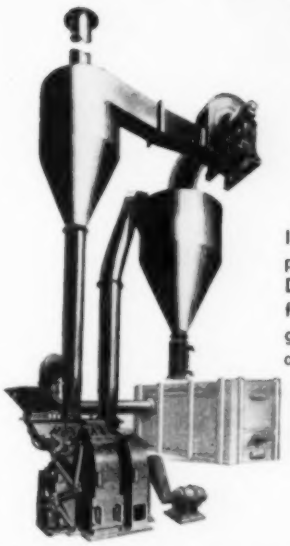
AND Fine GRINDING



RAYMOND
VERTICAL MILL
For superfine pulverizing.
Built in two sizes.

SINCE 1887

RAYMOND Specialized Equipment



RAYMOND
Imp Mill equipped with Flash Drying System for drying and grinding in one operation.

Write us for further information, mentioning the requirements of your special problem.

THE superfine, smooth-texture quality with which we are familiar in the best brands of pastries, confections and prepared foods, is not entirely a matter of good recipes or careful processing.

Back of all this is the preparation of the ingredients in their original form: the sugars, flours, spices, starches, chocolate and cocoa, milk concentrates, and proper blending of the materials into a homogeneous product.

Here Raymond equipment enters the picture in such important phases as drying, pulverizing and classifying, as well as the blending of the ingredients into intimate mixtures.

For the many different problems involved, Raymond provides a range of sizes and types of mills to suit the requirements of the plant operation and the kind of material handled.

The vertical Mill is used for extreme fine pulverizing in the lower micron range, all passing 325-mesh. The Imp Mill is adapted for disintegrating and separating, also drying and grinding, and may be used with the Mechanical Air Separator or equipped with a Whizzer Type Separator when a fine and uniform finished material is required. Screen Mills are available for medium fine grinding.

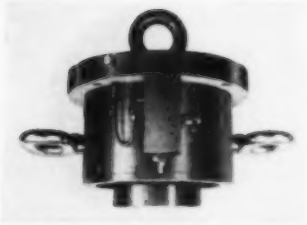
COMBUSTION ENGINEERING-SUPERHEATER, INC.
RAYMOND PULVERIZER DIVISION
1311 North Branch Street, Chicago 22, Illinois
Sales Offices in Principal Cities. Canadian Office: Montreal

Process Equipment News

THEODORE R. OLIVE, Associate Editor

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VERSATILE WEIGHERS:

Hydraulic Load Cell

Baldwin Locomotive Works, Testing Equipment Dept., Philadelphia 42, Pa., has announced improved versions of its hydraulic and pneumatic cells for the weighing of tension and compression loads. The Emery hydraulic cell for maximum compression capacities of 20,000, 40,000 and 60,000 lb. is now designed for maximum tension loads of half these capacities. Load ranges may be as low as from 0 to 1/20 of the maximum capacities indicated when using a bourdon tube indicator, or as low as from 0 to 1/100 of the maximums mentioned when using a Tate-Emery indicator or recorder. In these devices a frictionless piston to which the load is applied transmits pressure through very small movement to a hydraulic cylinder separated from the piston by a metal diaphragm.

The company has also announced Tate-Emery air cells having a load range of 0-1.2 to 0-6 lb. in tension, or 0-2 to 0-10 lb. in compression. Similar air cells are available in capacities up to 1,200 lb. Employing a 66-in. indicating scale, the 0-2 lb. instrument gives a pointer movement of about 2 in. for each ounce. An air jet and baffle within the cell controls the action of a pneumatic force-balance system so that the air pressure automatically balances the load. Total movement of the load-sensitive member is less than 0.0005 in. This air pressure is transmitted to the load indicator.

NO EXPLOSION HAZARD:

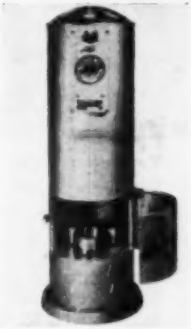
Floor Cleaner

Multi-Clean Products, Inc., 2277 Ford Parkway, St. Paul 1, Minn., has introduced a new explosion-proof floor-scrubbing machine, designed primarily for floor maintenance in hazardous areas, as in petroleum refineries, chemical and munitions plants. It is of explosion-proof construction throughout and its components are approved by Underwriters' Laboratories for hazardous areas.

EFFICIENCY HIGHER:

Improved Fan

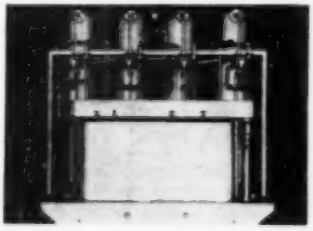
The Sturtevant Div. of the Westinghouse Electric Corp., Hyde Park, Mass., has announced that, through the culmination of development work on the centrifugal fan, new designs which reach a static efficiency of 80 percent will shortly be available. Best previous efficiency was 78 percent. The company's new Design 10 Silentvane fan will be available in 23 sizes, with wheels from 1 to 9 ft. in diameter, for capacities up to 480,000 cu.ft. of air per min. The increased efficiency is achieved by several design changes in the fan's blading, wheel, inlet, backplate and scroll, which together enable the fan to move more air while consuming less power.



QUICK RESULTS:

Drying Oven

Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4, Mich., has announced a new laboratory dryer for drying control tests, which employs a motor-driven fan to force filtered air past electric-heating elements, at drying temperatures from 150 to 350 deg. F. The oven has a drying space 8 in. in diameter and 6 in. in height, with overall height of the unit of 29 in.



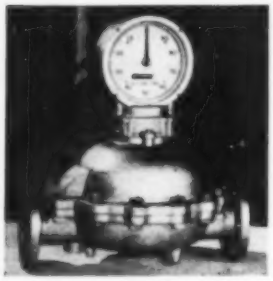
APPROACHES DISTILLED WATER:

Water Demineralizer

Industrial Filter & Pump Mfg. Co., 1621 West Carroll Ave., Chicago 12, Ill., has established an ion exchange department, and is now introducing a new line of water demineralizers rang-

(Continued)

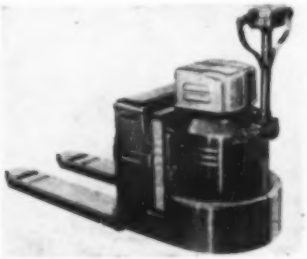
ing from laboratory to production size. The larger units, in both two- and four-bed models, deliver up to 1,000 gph. The four-bed model shown in the illustration delivers at a nominal flow rate of 200 gph.



MEASURES CORROSIVES:

Stainless Chemical Meter

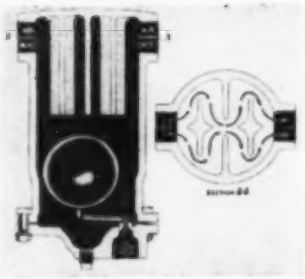
Buffalo Meter Co., 2917 Main St., Buffalo, N. Y., is building a new line of stainless steel chemical meters of the volumetric type for measuring corrosive liquids in capacities from 3 to 160 gpm., depending on the nature of the liquid. All working parts are Type 316 stainless steel or other corrosion-resisting materials. Such products as caustic soda, acids, liquid soap and molten sulphur can be handled.



BATTERY DOES THE WORK:

Powered Hand Truck

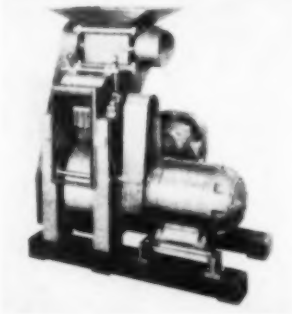
Towmotor Corp., Cleveland 10, Ohio, has entered the electric hand truck field with a battery-operated hand pallet truck, designed to be maneuvered in close quarters. Major features include rapid lifting of the load, high traction, a safety handle with control buttons for either right- or left-hand operation, and three-point suspension for smooth travel over uneven surfaces. An automatic power cut-off functions and applies the brakes when the control handle is released.



DEWATERS AIR:

Separator Trap

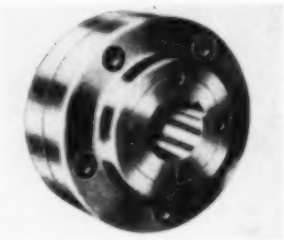
The Clark Mfg. Co., 1830 East 38th St., Cleveland 14, Ohio, is now producing a new design of combination separator trap of semi-steel construction, designated as No. 430. The device is used to remove entrained moisture and condensate from air supply lines, in five sizes from ¼ to 1½ in., and at pressures up to 200 psi, depending on size. The design combines an inertia separator and a ball float trap in one unit, thus simplifying installation and saving space and pipe fittings.



FOR STICKY PRODUCTS:

Plastic Grinder

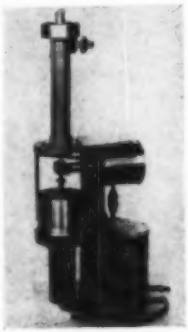
Pulverizing Machinery Co., 130 Chatham Rd., Summit, N. J., has announced an improvement in its mills for the grinding of plastic-type materials. Known as the No. 2 S-P Mill, the machine is designed to handle materials which are plastic in character by reason of having a high moisture or oil content. It will, for example, handle clay bodies having a moisture content of from 18 to 22 percent. Originally this mill employed a feed belt in place of the customary screw feed mechanism, but in the new model a roll or drum replaces the belt to give fewer parts and greater flexibility. The mill is said to be employed now in virtually every plant employing the dry process for preparing clay for electrical porcelain manufacture. It is also being used in granulating DDT and benzene hexachloride.



EASY-ON-OFF:

Taper-Lock Coupling

Dodge Mfg. Corp., Mishawaka, Ind., is now offering a rigid shaft coupling incorporating the Taper-Lock feature originally introduced on V-belt sheaves three years ago. By means of this construction the couplings can be easily installed and removed from shafts. The Taper-Lock type will replace the old style flange couplings made by this concern in sizes up to 2¾ in., but will be furnished also in sizes up to and including 5 in.



FOR PLASTIC FLUIDS:

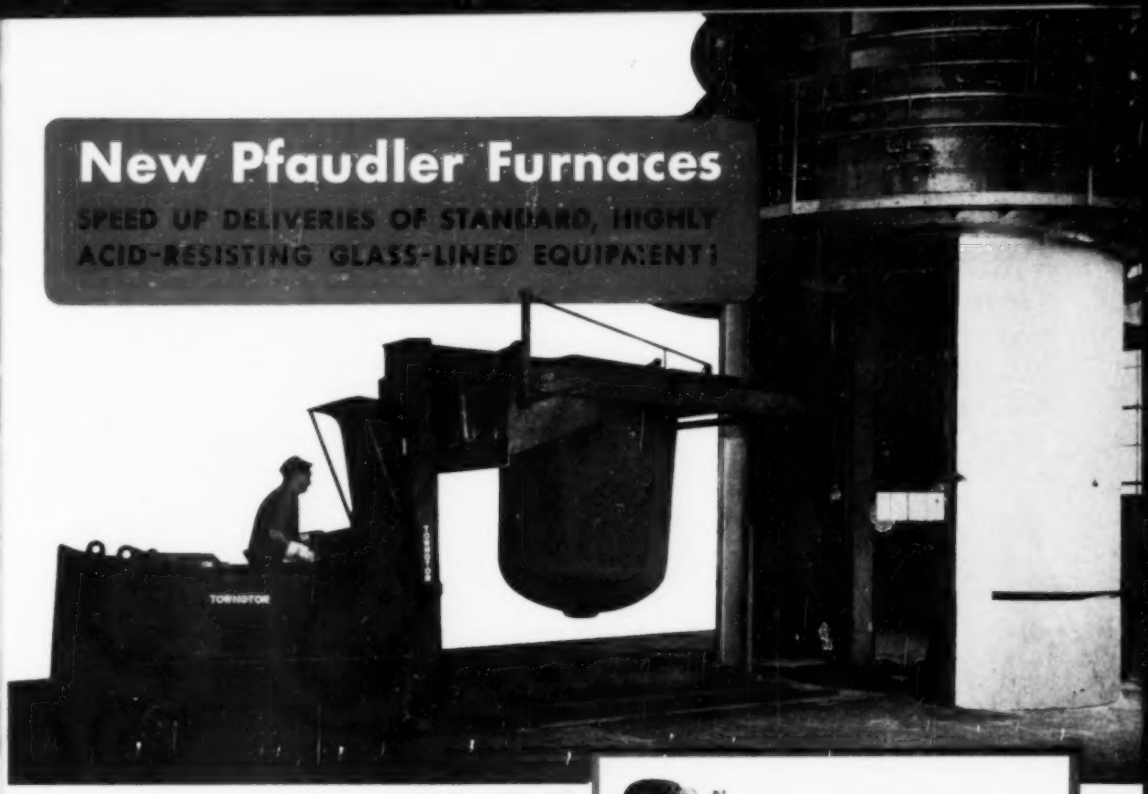
Texaco Viscosimeter

Southwestern Industrial Electronic Co., 2831 Post Oak Road, Houston 6, Texas, is now offering a viscosimeter developed by the Texas Co. specifically for handling plastic fluids and thixatropic suspensions, or other non-Newtonian fluids. The instrument has been redesigned and improved over a three-year test period in the Texas Co.'s laboratories. It features wide

(Continued)

New Pfaudler Furnaces

SPEED UP DELIVERIES OF STANDARD, HIGHLY ACID-RESISTING GLASS-LINED EQUIPMENT!



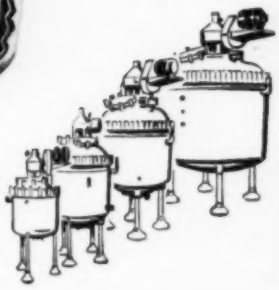
To speed up the delivery of its popular line of standard, highly acid-resisting glass-lined "E" Series Reactors, Pfaudler has installed new gas-fired furnaces at both its Rochester, New York and Elyria, Ohio factories. These added facilities double previous capacity . . . cut down delivery time at least 50%!

For processes requiring acid-resisting equipment at nominal pressure, specify Pfaudler "E" Series. Besides saving yourself time, you will save money. You take advantage of production economies developed through standardization. You save engineering time and cost.

Jacketed in construction, Pfaudler "E" Series range in size from 100 to 1000 gallons. Models from 100 to 750 gallons are stock units. They are available with or without top heads, agitators, adjustable baffles and drives. Operating flexibility is achieved through the acid resistance of Pfaudler glass and the various alternatives that are offered to meet special requirements. Ask for Bulletin 817.



Standard Pfaudler "E" Series acid-resisting glass-lined reactor—available with impeller agitator and adjustable baffle (patented) for gas absorption, emulsions, suspension of solids, etc. Anchor type agitator is used for simple mixing operations.



Stock units of Pfaudler "E" Series Glass-Lined Reactors carried in sizes from 100 to 750 gallons. Any unit may be obtained with or without top head, agitator and drive.

Pfaudler

THE PFAUDLER CO., Rochester 3, N. Y. Branch Offices: 330 W. 42nd St., N. Y. 18, N. Y.; 111 W. Washington St., Chicago 2, Ill.; 1323 Howard St., San Francisco 3, Calif.; 818 Olive St., St Louis 1, Mo.; 13231 W. McNichols Rd., Detroit 21, Mich.; 1318 1st Nat'l Bank Bldg., Cincinnati 2, Ohio; 1041 Commercial Trust Bldg., Philadelphia 2, Pa.; 751 Little Bldg., Boston 16, Mass.; 334 Chattanooga Bank Bldg., Chattanooga, Tenn.; P. O. Box 4066, Dallas, Texas; Enamelled Metal Products Corp., Ltd., Artillery House, Artillery Row, London, S. W. 1, England.

THE PFAUDLER CO., ROCHESTER 3, NEW YORK

ENGINEERS AND FABRICATORS OF CORROSION RESISTANT PROCESS EQUIPMENT

Glass-Lined Steel . . . Stainless Steels . . . Nickel . . . Inconel . . . Monel Metal

Silicone News

DC SILICONES

DC 44 Silicone Grease Ends Bearing Failure in Textile Plant

Bearing failure may burn out your motors, stop your entire production line or ruin a mill run. That's why it's front page industrial news when the Plant Manager of the American Finishing Company reports that he has not had a single bearing failure since he started to use Dow Corning Silicone Oils and Greases over 30 months ago.

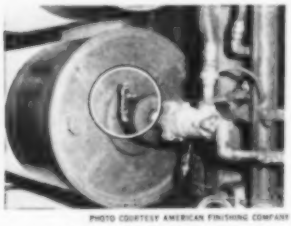


PHOTO COURTESY AMERICAN FINISHING COMPANY

DC 44 Silicone Grease in ball bearings on drying cans, operating at 400 r.p.m. around saturated steam journals, has at least 45 times the life of the organic grease previously used.

Typical of the lubrication problems that plague plant engineers in textile plants is the maintenance of "steam-heated" bearings. It used to be necessary to lubricate bearings on drying cans and the main cylinder bearings of Sanforizing machines once every 8-hour shift. Since American Finishing started to use DC 44, the re-lubrication schedule has been cut to once every two to three weeks. The lubrication of Slashers on textile mills presented a similar problem that has been solved by using DC 44.

In traveling through ovens at 400°F., petroleum oils on tenter frame chains and races carbonized so rapidly that the chains had to be cleaned periodically. That expense has been eliminated through use of DC 710R Silicone Fluid and re-lubrication has become a weekly rather than a continuous operation.

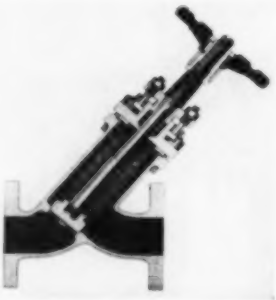
American Finishing like many other skillfully engineered companies has found that Dow Corning Silicone lubricants more than pay for themselves in reduced maintenance costs. Increased production due to the virtual elimination of bearing failure is another one of the many bonuses Dow Corning Silicones pay to modern industry. For the most recent data on DC Silicone Greases phone our nearest branch office or write for data sheet No. D5CD.

DOW CORNING CORPORATION
MIDLAND, MICHIGAN
Atlanta • Chicago • Cleveland • Dallas
New York • Los Angeles
In Canada: Fiberglas Canada, Ltd., Toronto
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Dow Corning
FIRST IN SILICONES

NEW EQUIPMENT, cont. . .

range, high speeds, stroboscopic checking of rotor speeds, continuous recording for any length of time, and characteristics designed to secure reliable results over a broad range of requirements.



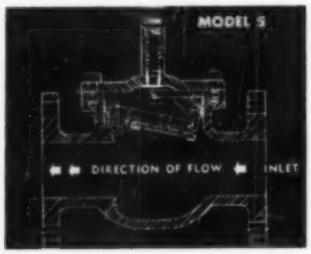
NO STUFFING BOX:
Packless Valve

Cook Electric Co., 2700 Southport Ave., Chicago 14, Ill., is now manufacturing a packless valve of Y type in sizes from ¼ to 12 in. Made by the company's Magnilastic Div., the valve employs a corrosion resistant metal bellows to seal the stem and eliminate packing. The bellows is made of formed metal diaphragms welded alternately at their inner and outer circumferences. Bellows can be made of any suitable corrosion-resisting materials and in tests have withstood as many as 1,000,000 cycles of opening and closing.



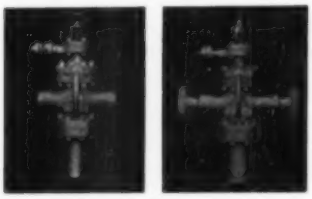
ELIMINATES HUMAN ELEMENT:
Printer Scale

Yale & Towne Mfg. Co., Philadelphia Div., Philadelphia, Pa., has announced a new type of weight printer as an integral part of its Load King industrial scales. The device not only prints the weight, but permits from one to eight numerals or letters to be printed opposite the recorded weight for identification. The printer can be adjusted to take tickets from 3x5 in. to 8½x11 in., and make from one to four copies. Printing is actuated by a depressor bar beneath the ticket slot, thus actuating a small electric motor which causes selector fingers to reach in and position themselves on the notched disks on the back of the pointer shaft. When they have positioned themselves, a solenoid is actuated, causing a rubber platen to press the inked ribbon against the type sectors and make an impression of the weight.



LOW-PRESSURE CONTROL:
Shut-Off Valve

Security Valve Co., 410 San Fernando Rd., Los Angeles 31, Calif., has announced an improved model of its Warden automatic low-pressure shut-off valve. The device, made in sizes ¼ to 8 in., is intended for use in gas or liquid lines where closure is desired when pressure fails from any cause. The mechanism, indicated in the accompanying drawing, requires no external actuating forces, and the valve can be set to close at any pressure specified. To assure safety resetting is manual. The trip diaphragm is of synthetic-rubber-impregnated nylon, and the seat of synthetic rubber.

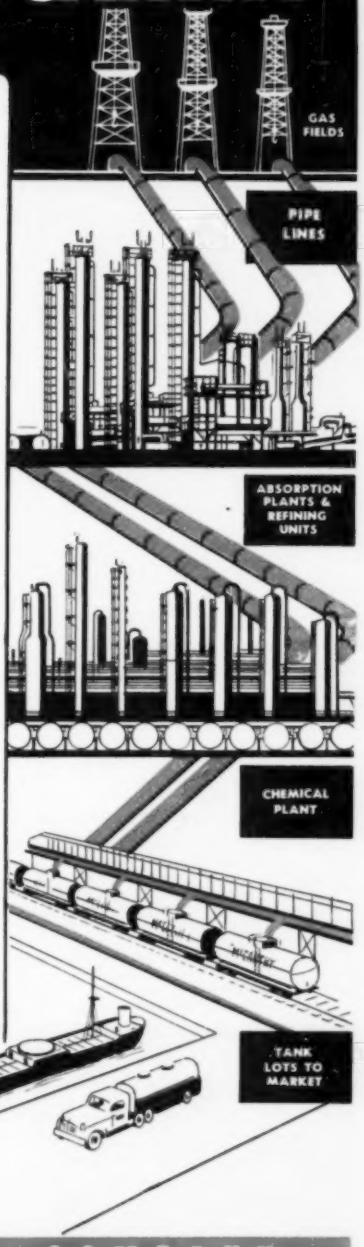


FOR SEVERE SERVICE:
Pressure Reducing Valve

Inlet pressures from 300 to 1,500 psi. on steam, or from 300 to 3,000 psi. on air or gas, can be reduced to 100-600 psi. with the new class HS pressure reducing valve offered by the Leslie Co., 64 Delafield Ave., Lyndhurst, N. J. The valve is suitable for

(*Continued*)

FLOW CHART CALLED McCARTHY



THE McCARTHY INTERESTS now form a flow chart that is unique in the production of primary and intermediate chemicals for Industry's expanding needs and exacting requirements. For this flow chart begins and ends with McCarthy-owned and operated facilities and resources that provide unlimited reserves of natural gas, a supervised gathering system, and the controlled processing of hydrocarbons. All these add up to predictable volumes of petrochemicals and assured supplies for the chemical processing industry.

From well to market, this steady, uninterrupted flow of vital raw products for plastics, dyes, explosives and various other chemical applications is meeting today's demands efficiently, economically and promptly.

McCarthy Chemical Company operates a fleet of 10,000 gallon tank cars, specially lined to guard against contamination, specially insulated against temperature changes; the company also maintains storage, dock and loading facilities on deep water.

NOW AVAILABLE . . .

- 37% Inhibited Formaldehyde
- 37% Uninhibited Formaldehyde
- Methanol
- Acetaldehyde
- Propane
- Butane
- Gasoline
- Kerosene
- Fuel Oils

IN THE INTEREST OF complete utilization of natural resources, McCarthy Chemical Company is also the supplier of abundant natural gas to industries of the Texas Gulf Coast — cheap, highly efficient fuel from which has been extracted the hydrocarbons diverted to the needs of the chemical industry. These practical developments in forward-looking conservation are dedicated to "New Horizons in Hydrocarbons."

A GLENN McCARTHY ENTERPRISE

McCARTHY

McCARTHY CHEMICAL COMPANY

G. M. McGRANAHAN, *Vice-President and General Manager*

SHELL BUILDING — HOUSTON, TEXAS TELETYPE HO-181 — PHONE: PRESTON 7204

Use

ANTHRAFILT*

For Any Filtering Condition

In thousands of installations ANTHRAFILT has proved the easy solution in clarifying chemicals of all kinds.

From this hard coal filter medium has been removed practically all minerals other than the inherent ash, so there is nothing left in the finished ANTHRAFILT which can contribute tastes, odors, or inorganic salts to filtered solutions.

ANTHRAFILT is widely applicable in the filtration of acetic acid, sulphuric acid, caustic soda solutions, etc.

EXCLUSIVE ADVANTAGES

- GREATER CAPACITY
- LONGER FILTER RUNS
- ECONOMICAL FILTER CLEANING
- GREATLY SUCCESSFUL IN FILTERING HOT SOLUTIONS

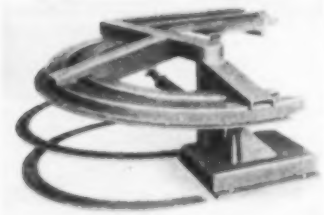
Plus many other advantages!

Write today for full details, test samples, and quotations.

PALMER FILTER EQUIPMENT COMPANY
822 E. 8 St . . . P.O. Box 1655 . . . Erie, Pa.
Representing
Anthracite Equipment Corporation
Anthracite Institute Building
Wilkes-Barre, Pa.

* Trade Mark Reg. U. S. Patent Off.

Another IRVINGTON JOB



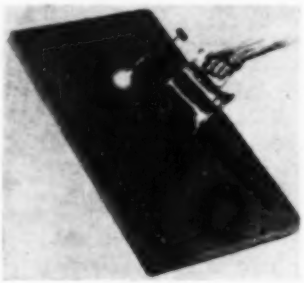
Repeater for continuous wire drawing mill.

IRVINGTON
STEEL & IRON WORKS
Established 1909
NEW BRUNSWICK, N. J.

* ENGINEERS—
* FABRICATORS—
* ERECTORS—

Inquiries Invited

maximum inlet temperatures to 1,000 deg. F. It is produced in sizes from 1 to 2 in. and requires no change of spring or diaphragm from minimum to maximum reduced pressure setting. Its action is claimed to be extremely fast and to provide positive dead-end shutoff. Interchangeability of replacement parts permits a complete overhaul without removing the main body from the pipeline. Critical parts are made of stainless steel or Stellite, while an internal pilot piston operating system is used.



STOPS HEAT COLD:

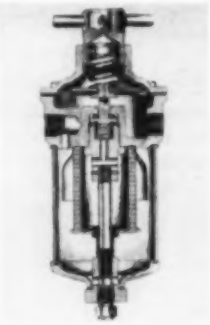
Low Temperature Insulation

Johns-Manville, 22 East 40th St., New York 16, N. Y., is now producing a new low temperature insulation said to have exceptional fire and chemical resistant qualities. It is designed for service within the range from −400 to +250 deg. F., and is made of mineral wool with a resin binder. It is immune to many organic solvents and is said to have zero moisture absorption in air of 75 percent relative humidity. Its *k* value is 0.28 at 70 deg. F., 0.25 at 0 and 0.22 at −70 deg. F. Intense flame will eventually work its way through the material, but the remaining area will be unaffected, according to tests conducted by the manufacturer.

PURIFIES WATER:

De-Oiling Apparatus

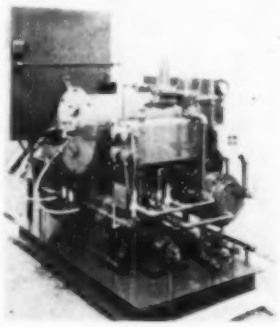
Lawson Products Corp., 39 Broadway, New York 6, N. Y. has developed an apparatus for removing oil and oil emulsions from water for boiler or process use, which employs no filter aids and has no moving parts. It consists of a closed, vertical, cylindrical shell containing separating and filtering elements, consisting of a series of three concentric cylinders of knitted steel wire. The device offers low resistance, but so much contact surface that the oil particles are said to attach themselves to the elements, gradually building up into globules which then work their way upward and are collected in chambers in the upper cover. The device is readily cleaned if necessary.



TWO JOBS IN ONE:

Regulator-Filter

Conoflow Corp., 2100 Arch St., Philadelphia 3, Pa., announces its new Model FH-15 combination filter and pressure regulator for instrument air. The device is made of forged brass or stainless steel and incorporates a relief valve as a safety feature. The filter medium is a phenolic-resin-impregnated cellulose cylinder, capable of removing particles as small as 40 microns. The regulator is suitable for inlet pressures up to 150 psi. and is available in ranges of 0 to 30 and 0 to 60 psi.

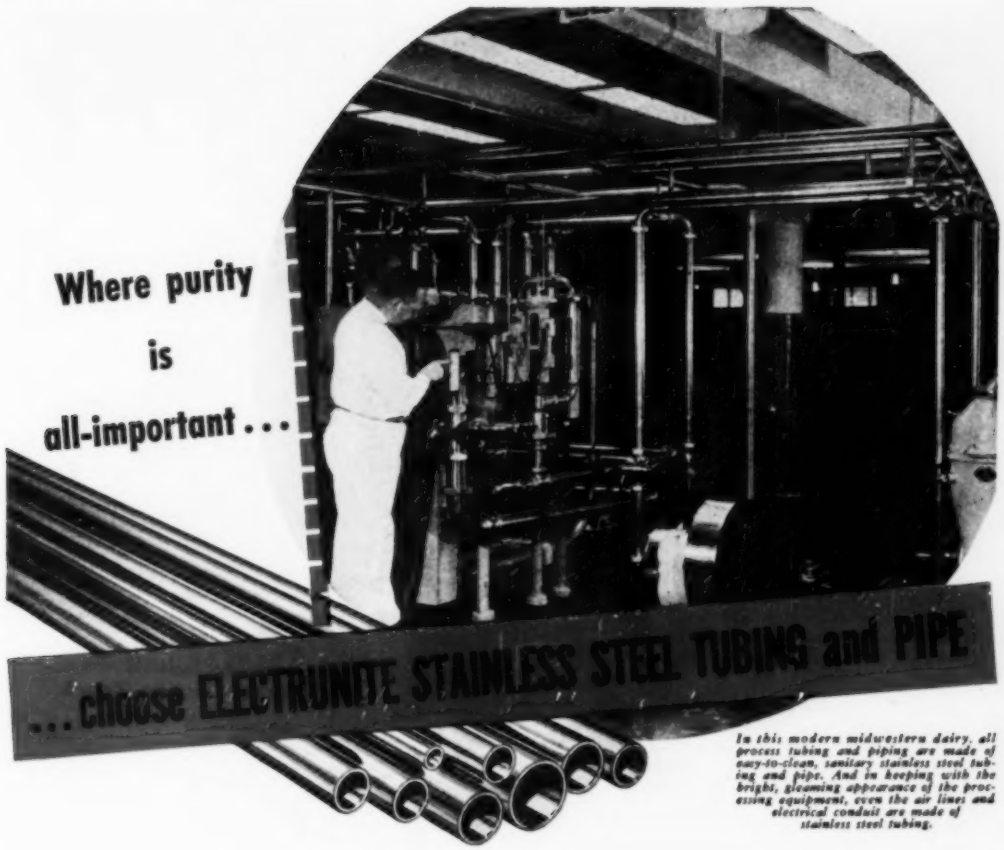


FOR SMALLER BOILERS:

Automatic Burner

Peabody Engineering Corp., 580 Fifth Ave., New York 19, N. Y., has introduced a new automatic oil burner designed to fire boilers at capacities of 100 hp. and upwards. The burner is available as a completely self-contained, packaged combustion system

(Continued)



In this modern midwestern dairy, all process tubing and piping are made of easy-to-clean, sanitary stainless steel tubing and pipe. And in keeping with the bright, gleaming appearance of the processing equipment, even the air lines and electrical conduit are made of stainless steel tubing.

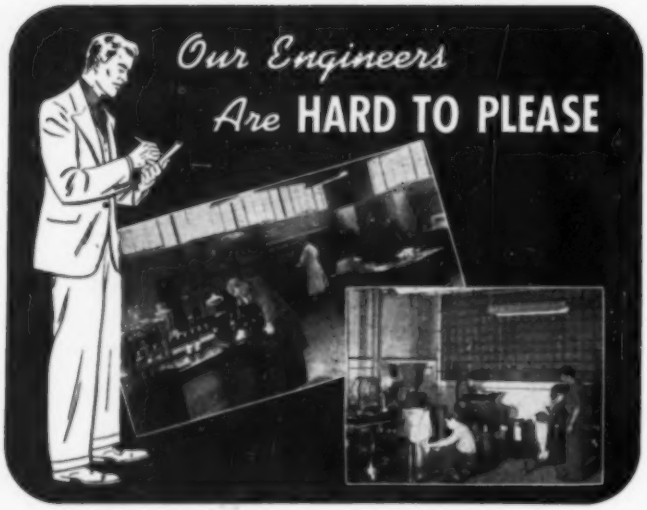
● In the processing of food, chemicals, pharmaceuticals and many other products, there can be no compromise with cleanliness, sanitation and freedom from contamination. That's why ELECTRUNITE Tubing and Pipe—made of gleaming Republic ENDURO Stainless Steel—are widely used for countless applications in these fields.

Because stainless steel inherently is a sanitary, non-contaminating material, ELECTRUNITE Stainless Steel Tubing automatically affords these basic advantages. And as produced by Republic's *improved* electric welding processes, this *modern* tubing is uniformly ductile, strong, sound and round . . . free from scale and scale pits both inside and out.

Where purity is all-important, the extra cost of stainless steel is extremely inexpensive insurance against sub-standard product quality. For complete information about ELECTRUNITE Stainless Steel Tubing and Pipe, write today for the name and address of your nearest ELECTRUNITE Distributor.

REPUBLIC STEEL CORPORATION
STEEL AND TUBES DIVISION • CLEVELAND 8, OHIO
Export Dept.: Chrysler Bldg., New York 17, N.Y.

Republic
REPUBLIC STEEL
ELECTRUNITE
STAINLESS STEEL TUBING



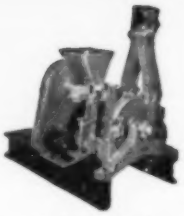
From start to finish . . . . from basic laboratory research to the smooth functioning of a machine fashioned specifically for your individual needs . . . . our technicians work tirelessly to lick your pulverizing and dust collection problems and to see that they stay licked.

They are steeped in a tradition nurtured by a quarter century of service which rejects the phrase "good enough." They are schooled in the philosophy of constructive dissatisfaction . . . . trained never to "let go" until they have given you a MIKRO-PULVERIZER, a MIKRO-ATOMIZER, or a MIKRO-COLLECTOR insuring the last word in the quality of your product and the very last pound in your potential volume.

Or, they will tell you frankly if their preliminary studies, checked against the data gleaned from 55,000 tests already made in our Laboratory, prove that our equipment is not adaptable to your use. They are never permitted to forget that our company built its worldwide reputation on the intensely practical consideration that its own profits will always ascend to the level of its ability to increase yours.

*Patents applied for by H. J. Hersey, Jr. and Pulverizing Machinery Co.

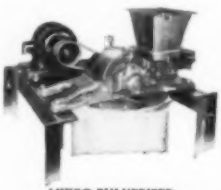
It costs you nothing to sample the thoroughness of these efforts in your behalf. Simply send today for your copy of our Confidential Test Grinding Data Sheet.



MIKRO-ATOMIZER
for grinding to 2 to 25 microns



MIKRO-COLLECTOR*
for optimum dust recovery

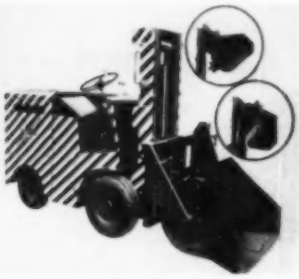


MIKRO-PULVERIZER
for pulverizing to 325 mesh

PULVERIZING MACHINERY COMPANY
55 CHATHAM ROAD • SUMMIT, NEW JERSEY

MIKRO-PULVERIZER
FAST
-ATOMIZER
ULTRA-FINE
Reg. U. S. Pat. Off.
Also Makers of the MIKRO-COLLECTOR

for either automatic or semi-automatic control, and incorporates a complete system of fuel oil-pumping and oil preheating equipment, together with a forced draft blower and wide-range constant differential mechanical atomizing oil burner. Installation in the field requires only the connection of service lines. The unit enables smaller boiler users to secure a single compact burner system without having to assemble parts from various sources.



LOADS AUTOMATICALLY:

Electric Scoop Truck

Capacities of up to 15 cu.ft., for loads weighing 3,000 or 4,000 lb., can be handled with a line of electric fork trucks equipped with pneumatic tires and an automatic self-loading scoop which is now being offered by the Crescent Truck Co., Lebanon, Pa. The self-loading scoop loads itself automatically when driven into a pile of loose material, without the use of hydraulic cylinders or other auxiliary power. The device can self-load 100 percent of capacity on loose materials and as much as 60 percent on materials of high moisture content, such as ceramic clay. Loads are released at any predetermined height by a fixed trigger, or at any height within the lifting range of the truck by a manually operated lever. A hydraulic self-actuating cylinder and metering valve are provided to assure dumping at any desired speed. This scoop is readily interchangeable with standard forks.

LIGHT, LONG-RANGE:

Dry Chemical Extinguisher

American-La France-Foamite Corp., Elmira, N. Y., has introduced a hand portable, gas-powered dry chemical extinguisher, approved by Underwriters' Laboratories, and recommended for flammable liquid and electrical fires. The dry chemical is non-

Continued

Penfield

Pioneer in ION EXCHANGE systems

ANNOUNCES a new **1000** *gals/hr DEMINERALIZER*

the best . . . most economical demineralizer on the market



National average chemical cost
15c per 1000 gallons
(one hour's production)

If you manufacture

CHEMICALS, TEXTILES, DETERGENTS, TELEVISION TUBES,
DRUGS & MEDICINES, GLASS & CERAMICS, PULP & PAPER

read this

For the first time in years, you can cut the cost of one of your raw materials—WATER! If you distill water, you can reduce costs as much as 85 percent. The lower costs are made possible by a new approach to the problem. Instead of separating water from the impurities as in distilling, Penfield reverses the procedure, subtracting the impurities (the lesser) from the water (the greater). There's no heating, no cooling, no trouble.

HOW IT WORKS—In the first chamber raw water passes through a bed of cation resins where it is acidified. In the second, it passes through anion resins and is neutralized. In the third and fourth chambers, any calcium, magnesium, etc., remaining is captured. The water comes out sparkling clear, clean, pleasantly tasteless—chemically equivalent to distilled water.

In low total solids districts, the chemical cost of the Penfield process runs as low as 3¢ per 1000 gallons of treated water. In high total solids areas the cost runs higher. In Kalamazoo, for instance, where the ionized solids average about 500 parts per million, chemical costs run 37.5¢ per 1000 gallons. But, up and down and across the land, the average is less than 15¢ per thousand.

If you have any water chemistry problem, from reactivating a water softening unit by changing to new Penfield High Capacity Resins to a big installation requiring expert chemistry and engineering service, write us. If the need is immediate, we will fly one of our engineers to meet with yours. Standard models from 1nh. size up.

. Money Back Guarantee

PENFIELD MANUFACTURING CO., INC.
20 High School Avenue, Meriden, Conn.

Penfield Manufacturing Co., Inc.
20 High School Avenue, Meriden, Conn.

Gentlemen: Please quote on 1000 gallons per hour water demineralizer.

Water source_____

Water analysis_____

Product manufactured_____

Your name_____ **Title**_____

Firm_____

Street and City_____

Water Softening Resins for Industrial Use . . . Water Treating Equipment for Every Purpose



...with Transite Industrial Vent Pipe on the job

TRANSITE* Industrial Vent Pipe was selected for this laboratory venting system because it resists the corrosive effects of many vapors, gases, fumes . . . because it will provide effective and economical venting service for years to come.

Transite makes up into neat, efficient venting systems for a wide variety of industrial uses. As vents, ducts, stacks, this asbestos-cement pipe is quickly and economically installed . . . is light, strong and durable. It is readily workable—can be cut and drilled on the job. Rustproof, it needs no painting whether used indoors or out.

Transite Industrial Vent Pipe comes in a range of sizes up to 36" in diameter. The full line of Transite fittings meets practically any job requirement and assures a venting system which is corrosion-resistant throughout.

For further details, write for Data Sheet Series DS-336. Address Johns-Manville, Box 290, New York 16, N. Y.

JM

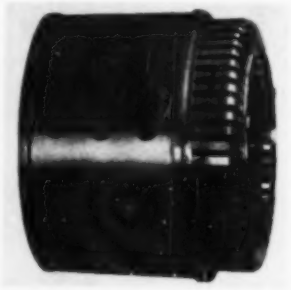
Typical industries in which Transite Industrial Vent Pipe is used:

Aircraft	Dairy	Gas	Petroleum	Shipbuilding
Automobile	Drug	Glass	Potash	Shoe
Baking	Electrical	Laboratory	Pulp & Paper	Smelting
Bleaching	Explosive	Laundry	Quarrying	Soap
Boiler Works	Farm Machinery	Leather	Railroad	Soft Drink
Brewing	Food	Meat Packing	Rayon	Sugar Refining
Canning	Foundry	Metal	Refrigeration	Textile
Ceramic	Furnace	Mining	Rubber	Tool
Chemical	Furniture	Paint	Sewage Works	Water Works

*Reg. U. S. Pat. Off.

Johns-Manville
TRANSITE Industrial Vent PIPE

toxic, non-corrosive, a non-conductor of electricity, and it will not freeze. The unit is said to have a larger range and to weigh less than other comparable equipment.



STARTING CURRENT LOW:

Improved Induction Motor

Electric Machinery Mfg. Co., Minneapolis 13, Minn., is now offering its new Design "X" extra-low starting kva. squirrel-cage induction motors in sizes from 60 to 250 hp. These motors are designed for direct connection to air compressors operating at 720, 600 and 514 rpm. The motors can be started across the line with a starting kva. 20 percent lower than that of the present NEMA Design B low-kva., normal torque, induction motors. Motors are produced in the flange-mounted (overhung) type illustrated, as well as a two-bearing type.



HANDLES METALS, PLASTICS:

Powder Spray Pistol

Primarily for use in laboratories and research sections of industrial plants, a new small size flame spray pistol for applying powdered metals or plastics, or their mixtures, has been introduced by the Schori Process Division of Ferro-Co Corp., 8-11 43rd Road, Long Island City 1, N. Y. As

(Continued)



three-point Dependability



Out of Mathieson's three producing points—each geographically located in principal caustic-consuming areas—roll hundreds of modern tank cars speeding to meet industry's need for high-grade caustic. The strategic location of these three plants permits substantial savings in shipping costs... provides *dependable* sources of caustic to consumers having several plants in areas served by Mathieson—*one* source of supply with *three* producing points.
Mathieson Chemical Corporation,
60 East 42nd Street, New York 17, N.Y.

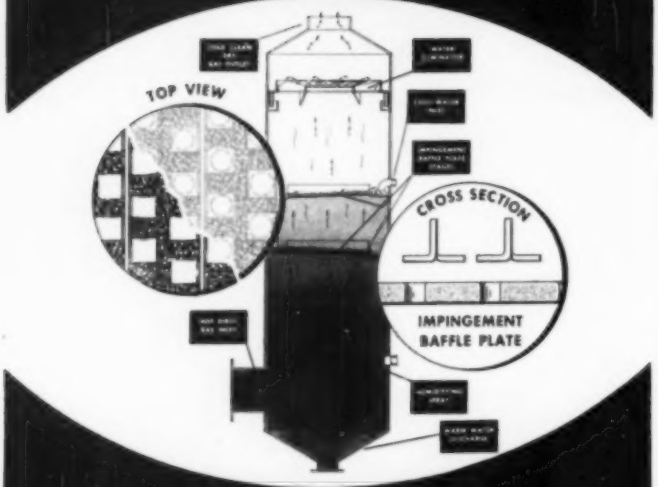
Specify Mathieson



Mathieson
CHEMICALS

Caustic Soda . . . Soda Ash . . . Bicarbonate of Soda
Liquid Chlorine . . . Chlorine Dioxide . . . Ammonia,
Anhydrous & Aqua . . . HTH Products . . . Dry Ice
Carbonic Gas . . . Sodium Chlorite Products
Sodium Methylate

We Welcome



your gas cleaning and cooling problems

Peabody Scrubbers, Coolers and Absorbers utilize *Impingement Baffle Plates* to direct a multiplicity of small gas streams against wetted individual baffles located above each gas jet. Intimate contact between gas and liquid results from this scrubbing action and high efficiencies are achieved in eliminating suspended material from gases and in heat transfer, as well as in absorption processes.

Peabody equipment is serving many types of process plants operated by prominent companies throughout the United States and abroad. Typical gases handled by Peabody Scrubbers include those from rotary and shaft kilns, reaction vessels and combustion chambers.

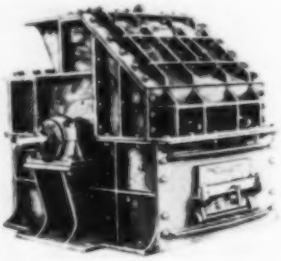
The experience gained from a wide variety of installations is at your service; an inquiry will receive prompt attention.

Write for Bulletin H-203-D

298-3

PEABODY
ENGINEERING CORPORATION
580 FIFTH AVENUE • NEW YORK 19, N. Y.
Offices in Principal Cities

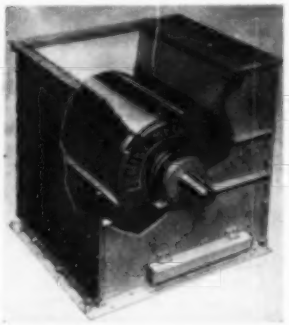
the powder is sprayed in a continuous flow, it passes through the temperature controlled flame and is heated to the temperature necessary to lay down a continuous film. It is stated that the pistol has been used extensively in AEC operations in applications of Fluorothene, Polythene, boron, aluminum, and other metals and plastics.



FOR FRIABLE MATERIALS:

Shale Crusher

American Pulverizer Co., 1219 Macklind Ave., St. Louis 10, Mo., is featuring the new ACS hammer mill, designed to reduce 250 tons of oil shale per hour. The crusher is also suitable for other high-capacity operations on friable materials. It is of heavy-duty construction with all crushing parts of manganese steel, and joints machined for dust tightness. Hammers are reversible, with three hammer types available. Both conventional front feed for a coarser product, or a special center feed for finer products, are available.



NON-ELECTRIC SEPARATOR:

Magnetic Drum

For the removal of tramp iron and fine ferrous contamination from materials conveyed in spouts or chutes (not belts), the Eriez Mfg. Co., Erie, Pa., has developed a permanent-magnet

(Continued)

A-B-C's of Permanent-Magnetic Separators

A. MATERIAL SELECTION



The type of alnico used (there are 12 grades) in a permanent magnet determines the "potential" strength. The strength of alnico is measured in terms of "External Energy" which is analogous to watts in electricity. For example, Alnico I has an external energy potential of 1,350,000 while Alnico V has from 4,500,000 to 5,000,000. Other grades of Alnico, used in some cases by separator manufacturers, are far less expensive but due to their low energy potential, should not be considered when producing a permanent magnet. In buying permanent magnetic separators, insist on properly selected Alnico materials.

PIONEERED BY Eriez

Permanent Magnetic Separators for tramp iron removal are now recognized throughout industry as safe, dependable, efficient and economical. For a number of years, Eriez pioneered this development alone. Strict Eriez qualifications as to material, strength and design are responsible for the rapid and wide acceptance of permanent non-electric magnetic separators. Eriez, from the first, a leader in design, experience, and understanding of permanent magnetic separation, is best qualified to give you (1) the most efficient magnets available, and (2) experienced application engineering. If you have a ferrous metal separation problem, it will pay you to investigate the complete line of Eriez Permanent Non-Electric Magnetic Separators.

B. DESIGN "KNOW HOW"



Top grade alnico material can be used in a permanent magnet and yet the unit can be far from satisfactory. Alnico materials are very critical in respect to design. Thorough knowledge of Alnico properties . . . "know how" design wise, is of first importance to design magnetic castings correctly and to obtain maximum external energy. Eriez, through its years of experience, designing permanent magnets only, can now invariably approach this maximum very closely because Eriez Engineers Know How.

C. ENERGIZING TECHNIQUE



The last phase in producing a permanent magnet of maximum external energy requires correctly designed powerful energizing equipment plus the correct charging technique. Specially built equipment, designed and maintained for this use only, packs the power into Eriez Non-Electric Permanent Magnetic Separators.

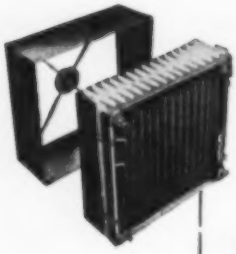
Write, wire or phone Eriez Manufacturing Co., 5116 East 12th St., Erie, Pa., U. S. A. Representatives in all principal cities.

Pioneer of PERMANENT Magnetic Separation

See our catalog P $\frac{1b}{2}$ Sweet's Processing Industries File

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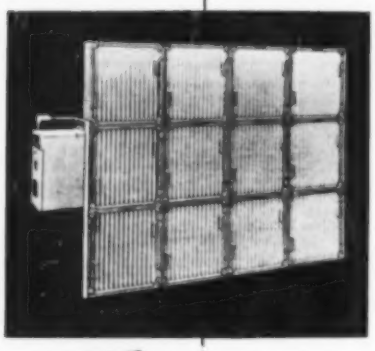


A new filter for air cleaning jobs that demand something better

New Electro-PL offers intermediate cleaning efficiency at lower first cost

THE new AAF Electro-PL filter is designed for those applications requiring better than normal air cleaning but do not justify the higher cost of super-clean air.

This dry-type electronic air filter averages 60% efficient by the Discoloration Method of Testing without the aid of an ionizing unit. Filtering media consists of Airmat* paper whose inherently high cleaning efficiency is almost doubled under electrostatic charge.



Elimination of ionizing unit assures a lower first cost, reduces power consumption and makes for simplified installation and maintenance. And with the Electro-PL on the job you enjoy positive protection at all times. If the electronic action should become inoperative, the air will continue to be filtered efficiently by the Airmat paper.

Intermediate efficiency with positive around-the-clock protection, they're yours for the first time in the Electro-PL at a pocketbook pleasing price. See your local AAF representative for complete details or write direct to:



Read all about it!
New dry-type electronic air filter delivers high cleaning efficiency without aid of ionizer. Complete information contained in Bulletin 287. Write for it!

AMERICAN AIR FILTER COMPANY, INC.
326 Central Avenue, Louisville 8, Ky.
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AAF
AIR FILTERS
AND ELECTRONIC PRECIPITATORS

**Airmat is the trade-mark (Reg. U. S. Pat. Off.) of the American Air Filter Company, Inc., for various air filters, dust collectors, and filtering media.*

NEW EQUIPMENT, cont. . .

drum type separator consisting of a revolving cylindrical shell within which is a stationary, high-powered permanent magnet which covers about half the cross sectional area of the drum. Material is fed on to the drum shell which in its rotation discharges non-magnetic material first, but holds magnetically susceptible material an additional time until the shell has passed out of the magnetic field. The unit is made in 18 sizes with drum diameters from 12 to 24 in., and widths up to 50 in.

Briefs . . . .

WELDING ELECTRODE. Eutectic Welding Alloys Corp., New York 13, N. Y., is offering a new low-temperature cast-iron welding electrode designated as 24/49 for producing high-tensile, machinable welds in both gray and alloy cast iron without preheating.

PIPE CLAMPS. A line of flexible band repair clamps for covering leaks in pipe lines is available from the Morris Coupling & Clamp Co., 22 Duncan Ave., Ellwood City, Pa. The repair clamp snaps over the pipe to cover the leak. A special feature permits the inner sleeve to be turned around inside the clamp shell in order to position the clamp for easy tightening, regardless of the leak location. If the pipe is past repairing, it may readily be replaced with a new length, quickly joined by slipping two compression type, gasket-sealed pipe couplings over the pipe ends. These couplings, for ½ to 4 in. i.p.s. pipe, are also a new development.

BUILDING MODELS. To improve layout techniques in a wide variety of industrial problems, the Visual Planning Equipment Co., Oakmont, Pa., is offering ¼-in. scale single- and multi-floor building models made of clear Lucite. Floors are provided with engraved grid scales. Buildings are complete with all columns, stair wells, elevator shafts and other physical building characteristics exactly to specification. Outside walls are indicated with white Lucite, broken at 4 ft.

STEAM GENERATOR. Livingstone Engineering Co., 100 Grove St., Worcester 5, Mass., has added a 1½-hp. boiler designated as Series 512 to its line of Speedylectric electrode steam generators. Three pressure ranges are available, 100, 200

(Continued)


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RECLAIMING, PLASTICIZING, NEUTRAL, CREOSOTE, AND SHINGLE STAIN OILS

MATERIAL HANDLING *News*



All these important benefits can be achieved for your business by a well-planned application of Clark materials-handling machines and methods.

Clark builds both gas-powered and electric battery-powered fork-lift trucks. Therefore, Clark's counsel on materials-handling problems can be—and *is*—wholly without bias. Major component parts are manufactured in Clark's own plants to



Clark's own exacting standards of excellence. Clark machines range in capacities from 1000 to 7000 pounds; and the Clark line of handling attachments meets a wide variety of special handling requirements. It is good judgment to CONSULT CLARK.

Write for the current issue of Material Handling News.

CLARK Handling Methods *Guarantee* Sizeable Savings

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3. *Quicker,* more accurate inventory
4. *Greater* safety for labor
5. *Elimination* of "time-wasting" and reduction of damage to materials

CLARK ELECTRIC AND GAS POWERED FORK TRUCKS AND INDUSTRIAL TOWING TRACTORS



INDUSTRIAL TRUCK DIV., CLARK EQUIPMENT COMPANY BATTLE CREEK 8, MICH.
REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE WORLD
AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

NEW EQUIPMENT, cont. . .

and 250 psig. These units are operated on 220-volt, single-phase power, and generate 45-lb. of steam per hour for small molding and industrial requirements.

LADDERS. The Aluminum Ladder Co., Worthington, Pa., is now offering a line of magnesium ladders which, in certain types, are replacing the aluminum ladders formerly produced. Magnesium has the advantage of weighing about ⅔ as much as aluminum.

PISTON RINGS. Morganite, Inc., Carbon Specialties Dept., Long Island City 1, N. Y., is offering a line of self-lubricating piston rings to prevent lubricant contamination in the output of air and gas compressors. These rings are not only self-lubricating but chemically inert and mechanically strong, it is claimed.

MOTOR SPEED CONTROL. General Electric Co., Control Div., Schenectady 5, N. Y., is now offering Type H1, a new low-cost Thymotrol drive in rating through ½ hp. for the stepless control of small conveyors, pumps, packaging equipment and mixers. The device utilizes a simplified half-wave circuit to provide d.c. flexibility from a.c. power. It offers a 20-to-1 speed ratio.

PACKAGED GAS UNIT. Eclipse Fuel Engineering Co., 721 South Main St., Rockford, Ill., has developed a gas combustion assembly known as the "Gas Pak" for the gas firing of many different types of heating equipment. A complete package unit, it comprises blower, burner, mixer, safety equipment, valves, regulator, piping and wiring. The unit is completely automatic.

HARD SURFACING. The Lincoln Electric Co., Cleveland 1, Ohio, has developed Surfaceweld A, a powder applied with a carbon electrode, for depositing a thin chromium carbide type of hard surface in applications where hard surfacing electrodes are not always practical. This includes thin work, thin deposits, and the use of small a.c. welders.

EXTINGUISHER. A new non-refillable carbon tetrachloride fire extinguisher, which contains 16 oz. of fluid and is pressurized with carbon dioxide, is being offered under the name of Hero by the Bostwick Laboratories, Bridgeport 9, Conn. Selling at very low cost, it can be operated by anyone, simply by pulling a trigger which breaks a seal. —*End*

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Secondary Butyl Alcohol—$CH_3CHOHCH_2CH_3$
Isopropyl Acetate—$CH_3COOCH(CH_3)_2$
Secondary Butyl Acetate—$CH_3COOCHCH_2(C_2H_5)$
Isopropyl Ether—$C_3H_7OC_3H_7$
Methyl Ethyl Ketone—$CH_3COC_2H_5$

ENJAY HYDROCARBONS

Butadiene—$CH_2:CHCH:CH_2$
Isobutylene—$CH_2:C(CH_3)_2$
Diisobutylene—$CH_2:C(CH_3)CH_2C(CH_3)_3$†
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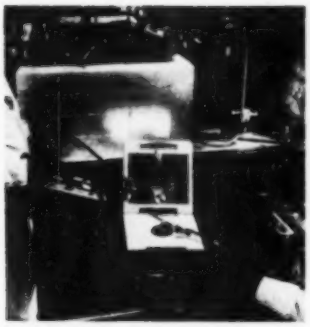
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*Trade Marks

New Products and Materials

JOSEPH A. O'CONNOR, *Assistant Editor*



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BELOW COST:

Radioactive Pharmaceuticals

Abbott Laboratories; North Chicago, Ill., is now producing a number of radioactive pharmaceuticals which are being distributed below cost to research and medical institutions. Abbott has long been engaged in the study of radioactive isotopes and their application to experimental and clinical medicine.

Among the new pharmaceuticals are iodine 131 labeled diiodofluorescein, gold 198 in colloidal gold, gold 198 labeled gold sodium thiosulphate, sulphur 35 labeled thiourea, iodine 131 solution (sodium iodine), phosphorus 32 solution (sodium phosphorus) and Pentothal containing S-35. These materials are standardized according to radioactivity and are prepared in forms suitable for direct administration or for pharmacologic experimentation. Others will be added from time to time.

Radioactive colloidal gold is being used in the experimental treatment of various tumors; radioactive diiodofluorescein, in the diagnosis and localization of brain tumors; solutions of radioactive phosphorus in the treatment of polycythemia vera; and iodine 131 solution in the study of thyroid activity.

Since these materials frequently are usable only for brief periods, special preparation and shipping methods are required. All materials are distributed from the Special Research Department of Abbott Laboratories, North Chicago, Ill. No specific prices have been set on the items, but they are being supplied as a contribution to research at substantial reductions below the actual cost of production.

Use of isotopic, or radioactive, materials is restricted by the Atomic Energy Commission to qualified research groups which have demonstrated their knowledge of the field, have laboratories for safe work and have received the approval of the commission. Several hundred such groups are now operating in the United States and are eligible for the materials produced by Abbott. Abbott is also prepared to cooperate with qualified research groups in the synthesis and development of other radioactive materials which such groups may wish to use.

OLFACTORY TIPOFF:

Gas Odorant

Oronite Chemical Co., San Francisco, Calif., has added to its line of gas odorants a new product, Oronite LPG Odorant, especially for odorizing LP-Gas.

Like natural gas, LP-Gas is odorless in its natural state and an odorant is added for public protection, to warn of leaks before an accumulation of gas may be exploded by an open flame or an accidental spark.

A minimum safety factor of at least 5 to 1 is provided by natural gas utilities and as high as 10 to 1 by companies providing LP-Gas service.

Extensive research and field testing work is required for development of a satisfactory odorant. These compounds are the most intensely odorous chemicals that can be made, but the odor must be of such a nature as not to be objectionable when the gas is burned. It must not saturate textile material such as rugs and draperies. Gas odorants are highly volatile so that they will disperse uniformly throughout the gas, and the purity must be of a high degree so that deposits will not form on meters, diaphragms, valves and other minute openings in gas appliances to hinder their proper operation. Oronite, together with California Research Corp. and the parent company, Standard Oil Co. of California, is a pioneer in the gas odorization field, having developed the first commercially manufactured gas odorant, Calodorant, for the natural gas industry in 1930.

Since that time two new odorants have been developed, Alert, a concentrated odorant for natural gas, and now the new LP-Gas odorant.

FOR WOOD WASTE:

Phenolic Bonding Resins

Durez Plastics & Chemicals, Inc., North Tonawanda, N. Y., has just developed a series of closely related phenolic resins for use in bonding wood waste, such as sawdust, in the production of building board or molded shapes. These resins are for use in the dry mix process and are in powdered or pulverized form.

The amount of resin used generally ranges from 5 to 15 percent of the weight of wood waste. The choice of the particular resin to use and the percentage of resin to wood waste depend upon processing, type of wood waste, color and strength or density desired in the finished board. Resin and wood waste mixes require hot pressing at 100 to 500 psi. at about 325 deg. F.

Samples of these Durez resins are available from the manufacturer upon request. Request should be accompanied by information about the method of processing employed, the type of waste used and the specifications required in the finished product.

HIGHER MOLDING TEMPERATURE:

Acrylic Molding Powder

E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del., is now producing commercially a new heat-resistant acrylic molding powder, latest product of its plastics research. This newest member of the Lucite line of

(*Continued*)

ROTH
STAINLESS PUMPS
Capacity 2 to 180 GPM
Head 0 to 400 Feet

Write for Bulletin 101
ROY E. ROTH COMPANY
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Rock Island, Illinois

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"LABORATORY" MARKER
Specially compounded, heat-resisting leads for dense, distinct and durable marking on all laboratory apparatus. Marks will not run at temperatures up to 300 degrees centigrade — can be removed with damp cloth. Ask for
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acrylic resins can be molded successfully at temperatures about 50 deg. F. higher than were practical with the heat-resistant material it replaces. The new powder has been designated Lucite HM-140 as distinguished from HM-122, its predecessor.

Increased heat stability and improved flow properties, according to Du Pont, give HM-140 a considerably broader molding range than that of HM-122. The new composition can be injection-molded at cylinder temperatures of 360 to 490 deg. F. This will enable molders to obtain the heat resistance in finished articles of HM-122, with the moldability of general-purpose acrylics.

The fact that the new powder can be successfully molded at higher temperatures than were practical with HM-122 will be a marked advantage in molding thin or intricate sections where fluidity must be greater.

In addition, Lucite HM-140 is more fluid at a given molding temperature than HM-122 was. It can be molded into thick sections at lower temperatures and therefore cools and hardens more rapidly than the old type. This results in a shorter molding cycle with less shrinkage of the molded piece.

Lucite HM-140 is more brilliant and lustrous than other acrylics. Color stability, both at high temperatures and on outdoor exposure, has been increased.

Other properties of the new composition are essentially the same as those of HM-122. Like all Lucite molding powders, it is available in colorless crystal and in many transparent, translucent and opaque colors. The new composition will be competitive in price with general-purpose acrylic molding powders.

FROM CORN:

Protein Fiber

Virginia-Carolina Chemical Corp., Richmond 8, Va., is currently producing Vicara, the only protein fiber on the market in the U. S. today. Vicara is made from zein.

Zein, a pure protein extracted from corn, was found to be ideally suited for fiber production because of the polypeptide linkage of the protein molecule. Even after the fiber possibilities of zein were discovered, there still remained years of laboratory research, pilot-plant operations and testing programs to improve and perfect the process and the product.

Vicara is produced as a soft, uniform fiber, light golden in color. Denier and staple lengths are carefully controlled. Under the microscope, Vicara appears as a cylindrical, translucent rod with a circular cross-section.

Vicara is clean, free of nails and contains no foreign matter. A crimp is imparted to the fiber to facilitate carding and spinning.

Specific gravity of Vicara fiber is 1.25. Its toughness index is 0.25 g. cm./denier/cm., and its stiffness index is 2.4 g./den./elongation.

Vicara has an elasticity comparable to animal fiber. Its tensile strength averages 16,000 psi. and its dry tenacity is 1 g. per denier. Elongation of Vicara fiber averages 42 percent in the dry state and 50 percent in the wet.

The new protein fiber is resilient and resists deformation to a marked degree. At 2 percent elongation, the modulus is 0.46 g./den.

Vicara has warmth equal to the finest wool. Laboratory tests indicate that its insulating value is similar to that of animal fibers in a fabric of like construction.

The new fiber is as water repellent as wool. This does not interfere with warm wet processing, such as washing, dyeing or scouring, because the repellency is not apparent at temperatures above 110 deg. F. The water repellency of Vicara is permanent at room temperature and is not removed by dry cleaning or repeated laundering. This fiber has a moisture regain of 13 percent. Its moisture absorbency is about the same as that of animal fibers. Total water retention is estimated at 64 percent.

Vicara swells when wet with water. When soaked in aqueous solutions of pH 7.0, the cross-sectional area increases 20 percent.

Vicara is odorless, except in warm aqueous solution where it has a faint, pleasant odor which disappears completely after processing. Vicara is insoluble in organic solvents.

Considerably less flammable than the cellulosic fibers, Vicara is not affected by temperatures up to 310 deg. F., if this heat is maintained for less than 40 min. After that time, and at higher temperatures, the fiber becomes slightly brittle.

This protein fiber is highly resistant to mildew and bacteria, and is completely repellent to moth and carpet beetle larvae.

Vicara is not affected by age and its degree of sensitivity to sunlight is similar to that of animal fibers.

Virginia-Carolina's new fiber resists acids and can be dyed with acid, chrome or metachrome colors, at the boil, in the conventional manner used for wool dyeing. Unlike animal and all other protein fibers, Vicara is not drastically affected by alkalis. Normal procedures, used in scouring,

(Continued)



Keeping stainless steel STAINLESS

. . . a typical problem in fabricating alloy piping

Heat a piece of stainless steel pipe to bend it and right away you're up to your ears in metallurgical complications. To begin with, stainless steel isn't just one alloy. There are hundreds of different types of stainless steel, each selected for its resistance to corrosion or its stability at high temperatures. To maintain the metallurgical properties which dictate the choice of a particular alloy steel, you have to know the temperature range within which this steel may suffer excessive metallurgical changes. And you have to have specialized equipment to maintain the precise control necessary to avoid these hazards.

Grinnell pipe fabrication equipment includes specially designed gas-fired radiant heat furnaces for this precisely controlled heat treatment of stainless steels and other alloy steels. Multiple burners are strategically located to distribute temperature uniformly and to prevent harmful flame impingement. Precision instruments regulate temperature and time.

It's an intricate business . . . fabricating alloy steel piping. It's a job for Grinnell prefabricating plants because Grinnell has the equipment and modern methods, the interpretive engineering, the metallurgical research facilities and the skilled personnel.

99 YEARS PIPING

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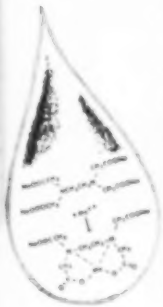
. . . can make your products (and processes) better!

VERSENE Fe-3* . . .

The powerful new sequestrant — does more than soften water without precipitation. It actually inactivates troublesome trivalent iron as well as calcium, magnesium and other metallic salts. Until VERSENE Fe-3 was developed, there was no really satisfactory sequestering or chelating agent for ferric iron. At pH7 10 cc of Versene Fe-3 sequesters at least 167 mg. of Fe_3 plus 158 mg. of calcium. Above pH9 it is most effective on alkaline earth ions.

VERSENE* (REGULAR)

Is the tetra sodium salt of Ethylene diamine tetra acetic acid and is available in solution or powdered form. Extremely versatile, economical and efficient, it may be used to do a variety of things such as:



- **Softening Water Without Precipitation**
- **Removing Hard Water Deposits And Precipitates**
- **Dissolving Grease And Food Deposits**
- **Clarifying Liquid Soap Solutions**
- **Preventing Oxidation Of Fats, Oils, Soaps, Fatty Acids, Organic Materials**
- **Stopping Reactions Catalyzed By Metallic Ions**
- **Aiding In Purification Of Materials**
- **Separating Metals From Each Other**
- **Reducing Activity Of Metal Ions**

VERSENE* is a pale, clear, straw-colored aqueous solution with *total solids* approximating 34%. It has an approximate *density* of 1.2 and an approximate pH of 11.75 in a 1% solution. VERSENE* is also available in crystalline form as a dry white powder. Send for Technical Bulletin No. 1. Ask for Fe_3 Data Sheet. Samples on request.

*Trade Mark

BERSWORTH CHEMICAL COMPANY
Framingham, Massachusetts

are adaptable to blends containing Vicara. In blends with viscose, Vicara may be dyed with alkali-soluble dyestuffs. In blends with cotton, Vicara can be mercerized.

Vicara is not damaged by dry cleaning, and can be boiled in water for many hours without injury. It is shrink resistant. After five launderings, at the boil, test fabrics show less than 2½ percent shrinkage in both warp and filling. Vicara is non-felting. It is also non-itching and has never been known to cause an allergy.

Vicara can be spun or woven on any conventional system. It can be processed and handled on regular textile carding, spinning and weaving equipment. It can be blended with cotton, wool, rayon, acetate, nylon or ramie and dyed with the usual dyes used for the other fibers.

Vicara comes in various deniers and staple lengths which make it adaptable to all systems. Record-breaking spinning times have been reported. In some cases, blend spinning is facilitated by the use of the new fiber. The Vicara fibers can be supplied in any staple lengths from ½ in. to 6 in., and in deniers from 2 to 4.

Vicara textile fibers are packaged in 300- and 500-lb. bales and can be supplied in tow form if desired. The textile fibers are available for prompt shipment from the Fiber Division of Virginia-Carolina at Taftville, Conn.

NO PRECIPITATION:

Emulsion Stabilizer

Consulting Research Associates, 6 Newbury St., Beverly, Mass., is manufacturing a new emulsion stabilizer and emulsifying aid called Teac-90. This product also functions as a color stabilizer and corrosion inhibitor, and possesses good dispersing action.

Generally, emulsions made in the presence of metallic ions and electrolytes are prepared with emulsifiers stable in these media. However, uncontrolled side reactions between various ions and electrolytes often indirectly break an emulsion or form an unstable or discolored emulsion. For example, Ca, Mg, Fe and Mn ions in a neutral or slightly alkaline phase will precipitate out and coagulate the dispersed phase. This condition may commonly result while exposing an emulsion to cement, concrete, plaster and other ceramics, as they contain a large amount of these ions, including such sources of alkalinity as $Ca(OH)_2$. Metals such as iron will normally corrode, and thus discolor an emulsion or the resulting film.

Possible impurities in pigments and

(Continued)



Robins Hydrex Screens bring high capacity and long cloth life to job of removing impurities

In removing contaminants from clay for bathroom fixtures, you must do the job fast and at low cost.

To be sure of lawns that would combine high capacity and long screen cloth life with required efficiency The Eljer Company, makers of fine bathroom equipment, tested various makes and types in pilot-plant operation.

Of all equipment tested, they found that only Robins Hydrex Screens assured the high capacity and long screen life they demanded.

In fact, they found that these screens could easily keep up with heavy increases in volume. Today four Robins Hydrex Screens handle a job that would require many, many *more* lawns of other types!

No wonder Eljer *standardized* on Robins Hydrex Screens throughout its modern new plant at Ford City, Pennsylvania!

Throughout the process industries, you'll find that Robins Hydrex Screens are speeding work, cutting costs. You can obtain them in many sizes, meshes and designs to screen materials that are hot or cold, acid or alkaline. You'll find a type to meet your particular needs . . . whether you want to:

1. **Save liquids from solids.**
2. **Save solids from liquids.**
3. **Remove fines from coarser materials.**

If you'd like to save time, save space and save money, find out what

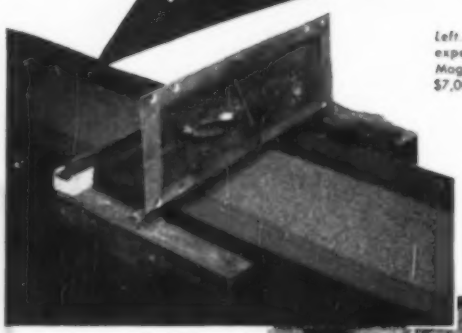
ROBINS
HYDREX SCREENS

Robins Hydrex Screens can do for you. Write for information today.

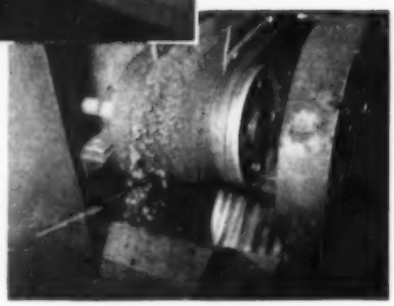
SEND TODAY for an analysis of your particular screening problem. Get full details on how it can be solved with Robins Hydrex Screens. Address Robins Conveyors Division, 270 Passaic Avenue, Passaic, New Jersey.

ROBINS CONVEYORS DIVISION **HEWITT-ROBINS INCORPORATED**

How to guard machinery magnetically



Left. Look at the iron on this inexpensive Dings PERMA-PLATE Magnet! It protects a set of $7,000 rolls. Bulletin on request.



Right. The PERMA-PULLEY for *fully automatic* iron-removal. Non-electric, no maintenance. Ask for Bulletin.

Protect crushers, grinders, pulverizers, stokers, screens, rolls, knives, pumps against tramp iron . . .

CHANCES are the cotton in your mattress passed over a Dings Magnetic Separator to remove stray iron that would otherwise wreck the bedding manufacturer's garnett rolls . . . your power company protects its coal pulverizers with these magnetic guardians to assure you 24-hour a day service.

Is your plant equipment as well protected? You can *guard* it *forever* against damage and down-time due to tramp iron with Dings new Alnico magnetic Perma-Pulleys and Perma-Plate Magnets . . . their magnetic permanence is *guaranteed for the mechanical life of the installation.*

DINGS MAGNETIC SEPARATOR COMPANY
4730 W. Electric Ave., Milwaukee 14, Wis.

Dings MAGNETIC SEPARATION HIGH INTENSITY

50 Years the Leader!

fillers may introduce these ions. Composition of surfaces treated with emulsions may contain these reactive ions.

Presence of a small amount of Teac-90 in an emulsion, in the presence of many ions and electrolytes, will prevent precipitation and coagulation and conversely aid emulsification.

Teac-90 will minimize or prevent discoloration of emulsions. It also acts as a corrosion inhibitor and as a penetrating and spreading agent with a tendency to produce a clearer film. It lowers viscosity, thus making it easier to apply thick emulsions at lower temperatures.

This new emulsion stabilizer may be simply added to the water phase before emulsification, or mixed into the finished emulsion, or directly mixed into the emulsion before use. The conditions and usage usually determine the procedure.

Teac-90 is highly effective. As low as 0.05 percent (based on total volume) has been used with good results in the presence of Mg, Ca, Fe and OH ions. It is economical to use, and serves as good insurance.

A clear, sirupy liquid, Teac-90 is soluble in water and some alcohols. It has a slightly alkaline reaction, and is stable to dilute acids and alkalis, as well as to moderate heat. It has a very faint odor, and is non-toxic.

Suggested applications for the new emulsion stabilizer include: (1) latex, synthetic and natural resin emulsions; (2) shoe dressings; (3) coatings, paints and creams; (4) auxiliary deflocculating agent for certain clays; (5) cutting oils; (6) leather and textile finishes; (7) dispersing agent for dyes and shellac; and (8) dry cleaners and sprays.

Prices are quoted on Teac-90 fob. Beverly, Mass. In 55-gal. drums (about 9 lb. per gal.) it sells for 47c. a lb.; in 5-gal. containers it sells for 55c. a lb. The 55-gal. drums and 5-gal. containers are non-returnable and are included in these prices. Cost in quantities less than 5 gal. is 70c. a lb., and 1 qt. sells for $2.50.

HIGHER VISCOSITY:

Low-Pressure Resin

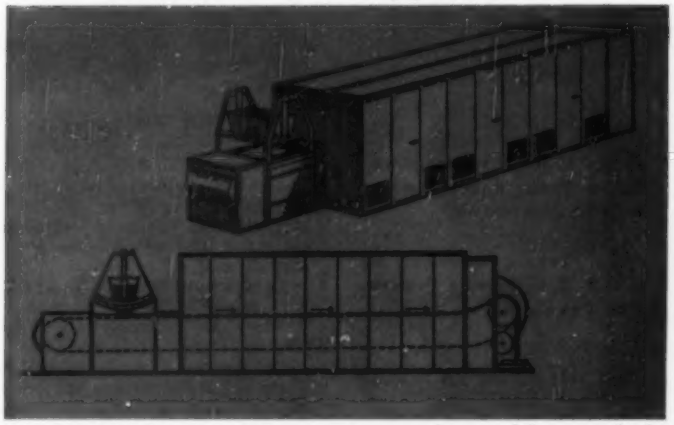
Resinous Products Division of Rohm & Haas Co., Philadelphia, Pa., is now making available in commercial quantities a new low-pressure resin. With a viscosity of 50,000 to 65,000 centipoises, the new resin can be used for plastics laminating, molding or casting operations. Its suggested uses: to improve laminating work by a thicker surface coating; to decrease

(Continued)

CHEMICAL Drying DATA BULLETIN 13

PUBLISHED MONTHLY FOR PROCESS INDUSTRIES EXECUTIVES AND OPERATING PERSONNEL

Continuing Study of Narrow Conveyor Dryer Reveals Many Advantages and Wide Possible Application



First introduced to the industry several months ago, the Proctor continuous conveyor dryer with a 2' wide conveyor has now been subjected to considerable study in the actual operation. This study has revealed this unit to be a highly adaptable piece of equipment for the process industries.

MAKES POSSIBLE CONTINUOUS DRYING FOR LOW PRODUCTION HIGH VALUE PRODUCTS

The introduction of this equipment makes it possible to dry continuously many products which heretofore could not be handled in continuous systems because output requirements were too low. Continuous drying systems have always been geared to output in tons per hour—while many high value products, otherwise suited to continuous handling—are produced in pounds per hour. Consequently these products have always been handled in batch systems and have not had the benefit of continuous processing. This narrow conveyor system now makes possible continuous drying for high value, low production products. Patterned after huge continuous systems, it incorporates all of the quality control features of the larger machines. Because of rapid drying possible with preforming and continuous conveyor drying, it is possible to take advantage of high temperatures and to capitalize on flexibility of temperatures. Certain features of design of these narrow conveyor dryers make possible the handling of heat sensitive and corrosive products without the danger of contamination.

COMBINES WITH PREFORMING FEEDS

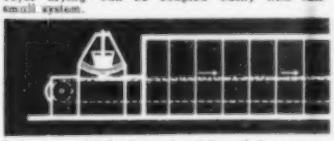
Any Proctor preforming feeding device can be engineered to dovetail with this low output system—thus bringing all the advantages of preforming to low-output products for the first time.

HAS PILOT PLANT APPLICATION

Representing an investment commensurate with pilot plant requirements—this application makes it possible for the operator to observe continuous drying in actual operation—at pilot plant scale output.



Fin drum feed, where product must be partially dried in order to hold a definite shape to be suited to conveyor drying—can be coupled easily with this small system.



Rolling extruder feed—used widely with large continuous systems—can be readily scaled to precede the narrow conveyor dryer. By means of this feed—product is formed into small extrusions and deposited on conveyor for drying.



Granulator feed—for comparatively dry solids whereby product is formed, through a screen, into relatively uniform granules. Ideally suited to lumpy or granular materials as well as hard framed press cake.

PRODUCT STUDY INVITED

Research into the physical characteristics and output requirements of your individual products will reveal how well this new narrow conveyor continuous system will meet your needs.

Much Proctor drying equipment and textile machinery is covered in full or in part by patents or patents pending.

PROCTOR & SCHWARTZ, INC. PHILADELPHIA, PA.



Can you Answer these Questions about HAMMERMILLS?

Q. *What are some of the important differences in various makes of hammermills?*

A. First and foremost is the degree of resistance to clogging when the material has high moisture content. Other differences involve: drying costs, capacity, power consumption, range of reduction, etc. All are important in terms of greater production at less cost.

Q. *What single difficulty is the one most often encountered in crushing operations?*

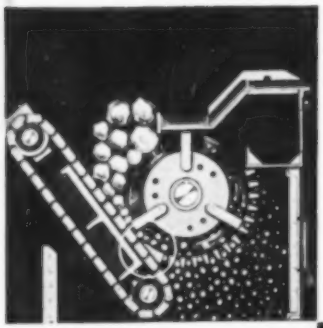
A. "Traffic jams" frequently result through inability of the average hammermill of conventional design to resist clogging in the handling of wet, clayey, sticky material.

Q. *Has this difficulty been successfully overcome?*

A. Yes . . . by the development on the part of Dixie engineers of a vastly improved crushing principle known as the Dixie Continuously Moving Breaker Plate.

Q. *Is the Dixie Continuously Moving Breaker Plate an exclusive Dixie feature?*

A. Yes . . . covered by U. S. Patents Granted and Pending.



Right! The Dixie Non-clog Continuously Moving Breaker Plate is the distinguishing characteristic of the famous Dixie Hammermill. Its time and money-saving features have practically revolutionized the reduction of raw materials in hundreds of installations all over the world. This singular record of accomplishment, proved in actual case histories, is your positive assurance that you *can do it better with a Dixie.*

Remember . . . there's only one Dixie. Don't be satisfied with anything less. For details request a copy of our helpful, informative bulletin, "More Efficient Crushing of Raw Materials."

DIXIE
MACHINERY MANUFACTURING CO.
4204 Goodfellow Ave. St. Louis 20, Mo. — 104 Pearl St. New York, N. Y.

the flow of resin prior to gelation in molding; to improve control of pigment and filler suspension in casting operations; or to increase film thickness of dip coatings.

One of the Paraplex P series, the new resin has been designated as P-43HV, and is identical to the tough, rigid Paraplex P-43 except that it is supplied at a polyester-to-styrene ratio of 80 to 20 instead of 70 to 30. Its high viscosity compares with that of 2,000 to 2,400 centipoises for the Paraplex P-43.

Both grades use the same base polyester, and both are filtered products, supplied by the Resinous Products Division of Rohm & Haas Co. as a clear, nearly water-white liquid.

NO DUSTING:

Synthetic Detergent

Monsanto Chemical Co., St. Louis 4, Mo., is now offering a light amber liquid synthetic detergent. It prevents dusting of powdered and dry detergent mixes.

The product, 100 percent active and non-ionic, is sold under the trademark Sterox CD. It is claimed that Sterox CD synthetic detergent will eliminate dusting at no extra cost because it can replace an equivalent amount of other surface-active agents normally used.

According to Monsanto, Sterox CD is an unusually effective detergent in its own right. It actually adds to the efficiency of the finished mix.

Addition of 1 to 2 percent of Sterox CD to dry mixtures will reduce dusting during the mixing operation and in the finished product. It can be atomized into dry powder, or introduced as a pilot-mix with the other ingredients. It may also be used in compounds for mechanical dish washers because of its low sudsing tendencies and excellent detergency.

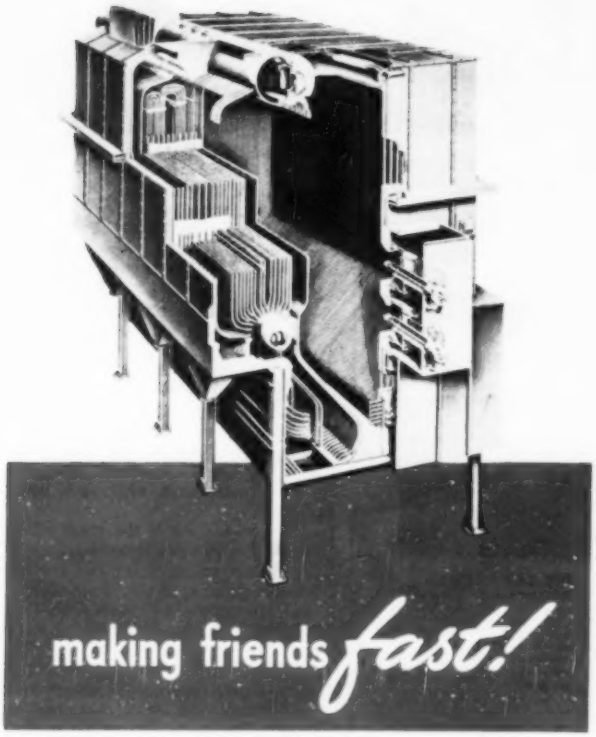
BLOWTORCH-TESTED:

Fire-Retardant Paint

Stallton Chemical Corp., 8-14 37th Ave., Long Island City 1, N. Y., is introducing for the first time for both consumer and industrial use a highly efficient new fire-retardant paint and coating that is also non-toxic. This paint is designed to protect lives and property.

When unpainted lumber is protected with a coating of Flame-Seal, as the new coating is called, the wood can withstand a 2,000 deg. F. blowtorch for 30 min. without any flame spread. Similar successful laboratory tests have already been made after

(Continued)



A fast-growing number of industries are finding the ideal answer to new steam requirements up to 300,000 lb. per hr. in the TYPE FH INTEGRAL-FURNACE BOILER. This latest B&W unit represents an important advancement in steam engineering. It brings together into modern, standardized designs all the desirable features of the original and highly successful Integral-Furnace Boiler introduced by B&W 14 years ago *plus* many new advantages that make possible still higher standards of boiler performance, dependability, efficiency and economy — each one time-tested and performance-proved in other B&W units. Evidence that the Type FH unit completely offers what boiler users consider most important today in steam generating equipment is its immediate and widespread acceptance. Since being made available less than four years ago, units totalling over 35,000,000 lb. of steam per hr. have been installed or are on order.



It will pay you, as it has so many others, to consult B&W engineers about this boiler when planning a new power plant or modernizing present power facilities.

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General Offices: 85 Liberty St., New York 6, N. Y.
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When it comes to
HANDLING
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SPECIFY ILLINOIS PORCELAIN!

Porcelain's inherent corrosive resistant qualities make it impervious to electrolytic action. Therefore it is outstanding as a successful handling medium for chemicals. Specify Illinois porcelain for permanent systems, thereby eliminating frequent replacements of corroded parts.



ANGLE VALVES
Available in all standard sizes from 1" to 6", these valves are designed for easy installation. Wherever an elbow can be removed, a valve can be installed because of exact dimensions.





PIPE AND FITTINGS
The inside and outside of all porcelain pipe and fittings are glazed white. The ends are ground true and smooth for gasket mounting. Flanges are accurately jig-assembled. Necessary bolts and nuts to make all connections are furnished for every joint.

WRITE FOR CATALOG C-2



Y-VALVES
Each Illinois valve has a very carefully ground and lapped valve seat which will hold chemicals at high pressures. Every valve is routine tested at 100 pounds pressure for a minimum of one hour to assure a perfect valve seat. Note that valve seat is located in lowest possible position to insure uninterrupted flow of material when stem is in open position. Packing is acid-resisting asbestos — graphite impregnated.



CHECK VALVES
Both vertical and angle check valves are porcelain to porcelain with no metal in contact with material being handled. Friction loss extremely low because ample space provided for flow around ball. Valve seat ground and polished to very close tolerances — ball is a polished sphere.

CHEMICAL
ILLINOIS
ELECTRIC PORCELAIN CO.
MACOMB, ILLINOIS

Flame-Seal was applied to typical fast-burning woods such as Douglas Fir, Idaho, Ponderosa and Yellow Pine. When fire attacks wood which has been coated with Flame-Seal, the unique paint undergoes a complete physical transformation. It immediately forms a white crust which creates a hard protective layer at least eight times the thickness of the original coating. Sustained exposure to the intense heat of a blowtorch flame on one spot for more than 30 min. will result in some charring, but at no time will the Flame-Seal coating support combustion.

Smoke and fumes released by burning paint are often more deadly than fire itself. However, tests show that Flame-Seal generates no smoke or toxic gases when attacked by fire. Moreover, the new fire-retardant paint gives off no toxic fumes while it is being applied.

The new paint is the result of 12 years of continuous research. Easy to handle, it comes ready for use, requires no mixing of special ingredients, and can be applied directly from its original container by brush or spray gun.

This fire-retardant paint is also said to be moistureproof and termite-proof, and it will not craze, chip, peel or crack. Moreover, it can be washed with any standard soap or washing powder without lessening its fire-retardant effectiveness. The manufacturer recommends his product for use on all interior raw wood surfaces. Flame-Seal is available in an oyster-white flat finish and can be obtained in single quarts, 2- and 5-gal. cans and 55-gal. drums.

INTERMEDIATES:

Lauric and Myristic Acids

Two fatty acids, lauric acid and myristic acid, are now being produced commercially by the El Dorado Oil Works of San Francisco. Besides having possibilities as chemical intermediates, these two acids have varied uses in soaps and cosmetics, in waxes and polishes, and as gelling agents.

El Dorado's lauric acid "60" gives a typical analysis as follows: acid number 259; saponification number, 275; melting point, 30.5-32.0 deg. C.; iodine number, 7; and fatty acid composition, 61.3 percent lauric acid and 2.3 percent capric acid, with 36.4 percent made up of myristic, palmitic, stearic and oleic acids. The lauric acid "90" has an acid number of 275 and a saponification number of 277. Its melting point is 42.2 deg. C. With an iodine number less than 1, this acid

(Continued)

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Here's the new general-purpose turbine that meets the increasingly rigid demands of modern industry. Wrapped up in one *standard* unit are the best features of previous Westinghouse drives . . . plus important refinements and new developments, including features formerly obtainable only as costly "specials"

The new "Type E" is designed to operate reliably and efficiently where the going is tough. It's built to give trouble-free, economical performance for long periods of continuous operation . . . or instant operation when used as a standby drive . . . regardless of operating conditions.

Weatherproof bearing seals, corrosion-resisting gland zones, centerline support for freedom of expansion and contraction, dual protection against overspeed, floating movement of governing and trip linkages, and parts interchangeability between wheel sizes are among the many advantages built into the new "Type E" drives.

← **GET THE FACTS.** We invite your comparison. For the full story, call your nearby Westinghouse office. Ask for the "Type E" Turbine book B-3896, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna. J-50498-A

Westinghouse TYPE E Turbines



Titeflex can furnish the

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Regardless of the nature of the gas or liquid to be handled, you can choose a TITEFLEX all-metal flexible tubing of the required corrosion resistance. For very corrosive materials, TITEFLEX is supplied with innercore made of monel, inconel, or stainless steel. For less corrosive conditions, brass or bronze tubing can be furnished. TITEFLEX also offers a wide choice of materials for braiding and fittings.

Remember too, that TITEFLEX is constructed entirely of metal—with no packing to wear away or disintegrate. You are always on the safe side when you specify TITEFLEX All-Metal flexible tubing. Write for Catalog No. 113.

Titeflex, Inc. 523 Frelinghuysen Ave., Newark 5, N. J.

Exclusive Manufacturers of Titeflex high quality products for more than 30 years

Sales Offices { CHICAGO CLEVELAND DETROIT PHILADELPHIA LOS ANGELES BOSTON SAN FRANCISCO TORONTO

consists of 95.0 percent lauric acid, together with 1.1 percent capric acid and 3.5 percent myristic acid. Melting at 52.7 deg. C., El Dorado's myristic acid has an acid number of 243 and a saponification number of 245. It analyzes 94.6 percent myristic acid, together with 2.6 percent lauric acid and 2.7 percent palmitic acid.

Maximum wetting action of soaps of saturated acids is found in lauric and myristic acids. They can be used in place of a larger quantity of coconut oil to achieve an increase in solubility and a more profuse lather. Myristic acid saponified with the amine type alkalis serves as an excellent base or emulsifying agent for cosmetics, shampoos and shaving creams. Myristic and lauric acid soaps increase the lathering and free-rinsing properties required in shampoos. Much of the stearine in shaving creams can be replaced with myristic acid. Myristic acid can be employed in rouge and lipstick formulations.

For emulsion type products for floors, furniture, automobiles or leather the amine soaps and glycol esters of lauric and myristic acids insure stable and effective emulsions. Aluminum laurate, derived from lauric acid, can be used in conjunction with aluminum napthenate and oleate as the gelling agent in solid fuels made from mineral oil fractions.

High purity of lauric and myristic acids makes them ideal raw materials for hydrogenation to their alcohols. For the same reason they can be employed for esterification reactions or for conversion to the various nitrogen compounds. Metallic soaps for special lubricants, paints, rubber, cosmetics and other products are readily manufactured to specification due to the lack of variation in these basic raw materials.

Currently available, both lauric and myristic acids are supplied by El Dorado in 1- and 5-gal. cans and in 55-gal. drums.

QUICK:

Paint Stripper

Quaker Chemical Products Corp., Conshohocken, Pa., is marketing a new paint stripper. Quaker Strip 15, as it is called, readily strips the new urea, melamine, vinyl and bis-phenol finishes of both the air-dry and baked types in less than five minutes. No expensive and hazardous solvent is used, nor is special equipment necessary.

This product is applicable to both new and old type finishes. A special stripping bath for either class of work is unnecessary. —*End*

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the East and the Great Lakes Areas . . .



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Once again, General Chemical expands production to serve industrial requirements. This time, extensive new facilities for Nitric Acid have been added to our Newell (Pa.) Works. For your operations in the East and Great Lakes areas, take advantage of the extra convenience and service these new facilities provide you.

Long a major source of sulfuric acid in this area, Newell Works is also in a position to supply ample stocks of mixed acid . . . in varying proportions to meet your requirements.

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36° Baume (52.3% HNO_3)
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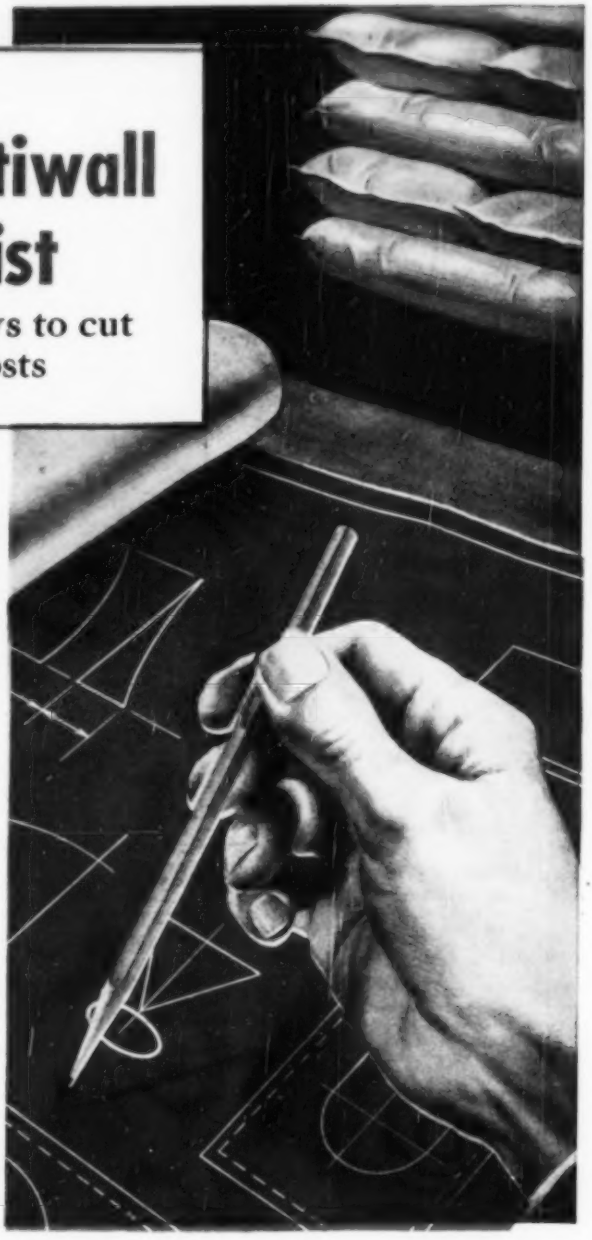
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Handling, Packaging and Shipping

R. W. LAHEY, Editorial Consultant



Philadelphia's Convention Hall during the materials handling show.

Current Trends in Materials Handling

In retrospect, the Materials Handling Show held earlier this year in Convention Hall, Philadelphia, points the finger at certain trends in mechanized handling. These trends can be more easily recognized by comparing this year's show with the one held in 1948 in the Public Auditorium in Cleveland, and the first exhibit of two years ago.

The large attendance at both the exhibition and the conferences is proof that they serve a worthwhile purpose. The principal advantage of a specialty show of this type is that it can cover all phases of materials-handling problems. It provides a place for technicians to see new equipment, to interchange ideas and to discuss their problems.

The first show in 1947 was smaller than those in the following years. It gave an opportunity to equipment manufacturers for the display of all the mechanized devices that had been developed during the war. It was packed with new equipment and provided a fertile field for the development of new applications for these machines. In 1948 and again this year, the equipment displayed followed more standard lines—there were fewer radically new things but many improvements in standard handling tools. Perhaps it may develop that a show every second year will serve industry adequately.

Fork-lift trucks and pallets for plant handling of unitized loads are increasing rapidly in popularity. There has been a noticeable increase in the number of manufacturers of both gas- and electric-powered trucks. Some of the older and larger manufacturers are enlarging their field—a gas-truck company is entering the electric-truck field and an electric-truck manufacturer has announced a gas-driven model. Of greater significance, however, is the trend to lighter models which may not require skilled operators. Powered hand pallet trucks with and without tiering features are examples of this trend. There seems to be no end to the development of such accessories as bale grabs, barrel and drum lifting devices, scoop attachments, etc. The trend is to make the fork-lift truck a basic tool which can be used for a combination of jobs by merely changing the forks.

Some little progress has been made on equipment for shipping of unitized loads. This has occurred largely in industries whose products are boxed, such as foods, automobile accessories and the like. Here again, the Philadelphia show indicated a trend—rather let us say, there is evidence of an attempt to overcome the difficulties which lay originally in the path of palletized shipments. Models of several different types of lightweight pallets and displays of some single-trip pallets were evidence of this effort. So far as we can observe, it is just not economically feasible to use returnable pallets weighing about 100 lb. for the 48 x 48 in.

(Continued)

Columnist Rewelcomed



Richard W. Lahey

After an absence of more than ten years, I am pleased to welcome back to these pages an old friend and valued contributor, Dick Lahey of American Cyanamid Co. We still have requests for his famous 1935-8 series of articles on the practical problems met in the packaging and shipping of chemical products. Since then he has taken on an additional interest and responsibility—materials handling in Cyanamid's many and varied plants. He is well qualified, therefore, to serve again as our Editorial Consultant. His monthly department will deal with developments and trends in these important phases of chemical engineering operations. He will welcome your comments and suggestions.

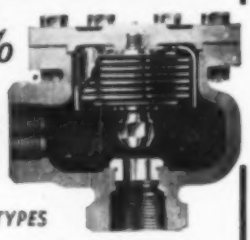
Sidney D. Kirkpatrick



NICHOLSON STEAM TRAPS *show*

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UP TO **30%**



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Due to their 2 to 6 times greater drainage capacity, Nicholson traps speed steam circulation. Installations show production increases up to 30%, with steam waste as low as 1%. Size ¼" to 2"; press. to 225 lbs. For details as to why leading plants are increasingly standardizing on Nicholson, send for BULLETIN 1047.

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size. A lightweight inexpensive pallet, structurally adequate for shipments of such chemical containers as drums, bags and barrels has not yet been offered.

Shovel trucks are solving materials-handling problems whether they be of the light car scoop type used for loading and unloading box cars or of heavier types used for moving coal and other heavy powdered and lump materials.

Two types of hydraulically operated truck loading docks were displayed for the first time this year. The use of mechanized equipment for loading trucks has made it necessary to provide loading bridges which can be raised and lowered to accommodate the variations in truck body heights. Standardization of truck body heights with the height of freight car floors would certainly help to solve one of many a shipper's problems.

Improvement in the simpler types of equipment such as two-wheeled hand trucks and dollies has been evident in each of the three exhibitions. Lighter materials of fabrication, such as aluminum and even magnesium, are becoming popular along with ball-bearing and rubber-tired wheels. Some of these two-wheeled trucks have been equipped with caterpillar tread rolls to facilitate movement upstairs and over curbs, some have a third wheel to eliminate weight on the operator, and there are many other refinements. The trend, of course, is to provide the worker with tools which will reduce fatigue.

Even the standard stencilling tools have been attacked by this determined effort to increase the productivity of labor. There was a rubber type marker displayed that can be used for marking boxes, barrels and drums. It is an efficient tool when a group of packages are all to be branded with the same information. A new type foundation marker for use with stencils or longhand writing is also available. A felt about 1 in. wide is used instead of a bristle brush and one stroke across the stencil is sufficient. The edge of the felt is used for longhand marking.

There were also indications of a trend to improved weighing mechanisms. Scales that print recorded weights, and batch weighing scales which successively weigh up to six charges of varying weights should prove interesting for specific applications. So-called "cells" actuated electrically, hydraulically and pneumatically have been designed for weighing. Previously used in testing equipment, they are now adaptable to commercial weighing operations.

Conveyors of all types, straddle trucks, hoists, barrel grabs, and many other labor-saving devices offered a wealth of valuable information to industry.

Packaging Engineers Form Eastern Division

A group of technicians and engineers in New York City has formed an organization for the interchange of information and discussions on packaging and materials-handling problems. The group is affiliated with the Society of Industrial Packaging and Materials Handling Engineers and will be known as the eastern division of the society. Gordon Bennett of Anaconda Copper Co., is president of the group.

With a membership of over 40 well-known technicians in this field, the society plans to have monthly meetings at which selected speakers will discuss specific packaging and materials handling problems.



1
Polyethylene spout sealed into pail.



2
Extended spout and polyethylene cap.



3
Transparency helps in control of flow.



4
Liquid being poured through FlexSpout.

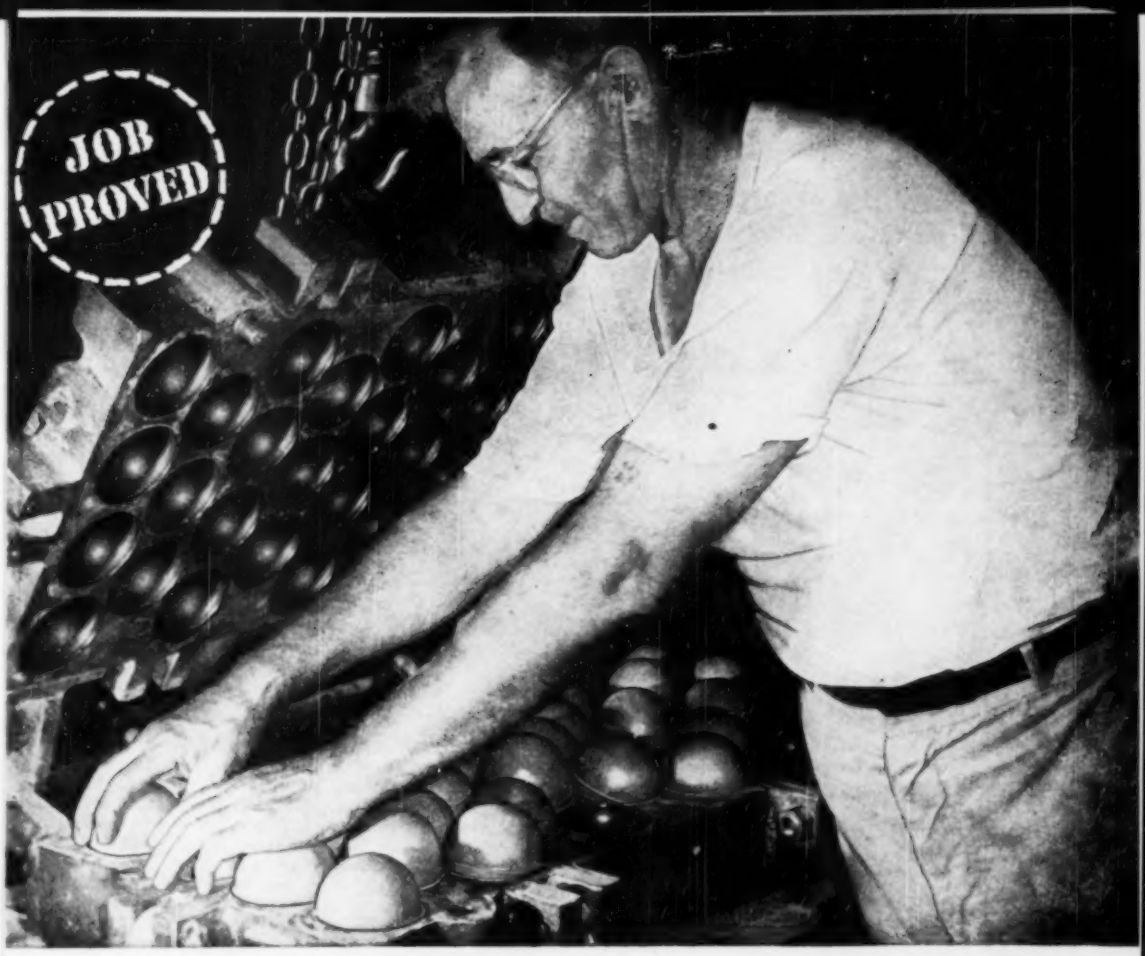
Built-In Polyethylene Pour Spouts for Pails

Polyethylene, one of the most versatile packaging materials is now being used in a pour spout for paint pails. Its manufacturer* claims to have met the need for a closure that is proof against leaks and rust, is tamperproof, provides a vapor-proof seal, and pours satisfactorily and completely.

Polyethylene is sealed directly onto

(Continued)

* *The Ricke Metal Products Corp., Auburn, Ind.*



SAVING $18,000 A YEAR

Sun Rubber-Processing Aid Improves Appearance of Rubber Toys, Cuts Manufacturing Costs

A manufacturer of rubber balls, miniature trucks, and other rubber toys was losing money because processing oils were bleeding out of the finished toys and spoiling the paint coating.

Switching to one of Sun's "Job Proved" Rubber-Processing Aids, he was able to stop all bleeding and at the same time make his lacquer finishes brighter and more enduring. Production men figured that costs were reduced by $1,500 a month.

In plant after plant where Sun Processing Aids are used, results like this are on record.

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4. **Sunaptic Acid-130,** a mixture of high molecular weight naphthenic acids and hydrocarbon oil. It functions in the same manner as stearic acid in the activation of curing agents for rubber. It is "non-blooming."
5. **Sundex-54,** a low-cost processing aid, highly compatible with natural and GR-S.

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the pail metal to provide a vapor-proof seal. The closure, with its metal tamperproof seal will withstand 35 psi. air pressure and with its screw cap and hermetic seal will withstand 70 psi.

After the metal seal is broken, the polyethylene screw cap removed and the hermetic seal cut out, the flexible spout is pulled out to the pouring position. After pouring, the spout can be collapsed and the screw cap replaced.

The efficiency of the pour spout has been proved by exhaustive tests. Tools for application of the closure are now being distributed to pail fabricators and pails so equipped should soon be on the market.

MCA Label Committee

At the February meeting of the Label and Precautionary Information Committee of the Manufacturing Chemists' Association, J. T. Fuess, Eastman Kodak Co., was elected chairman. This office was recently vacated by the untimely death of Warren N. Watson. Fred Bartenstein was elected vice-chairman. M. F. Crass, Jr., acting secretary of MCA will serve as permanent secretary of the committee.

This group is well equipped to furnish guidance to the chemical industry in the preparation of proper and uniform precautionary warnings for hazardous products. They hope to accomplish this through publication, in the near future, of a revision of their manual "Warning Labels" and to continue to review and to compose warnings for such hazardous compounds as have broad distribution or present unusual problems.

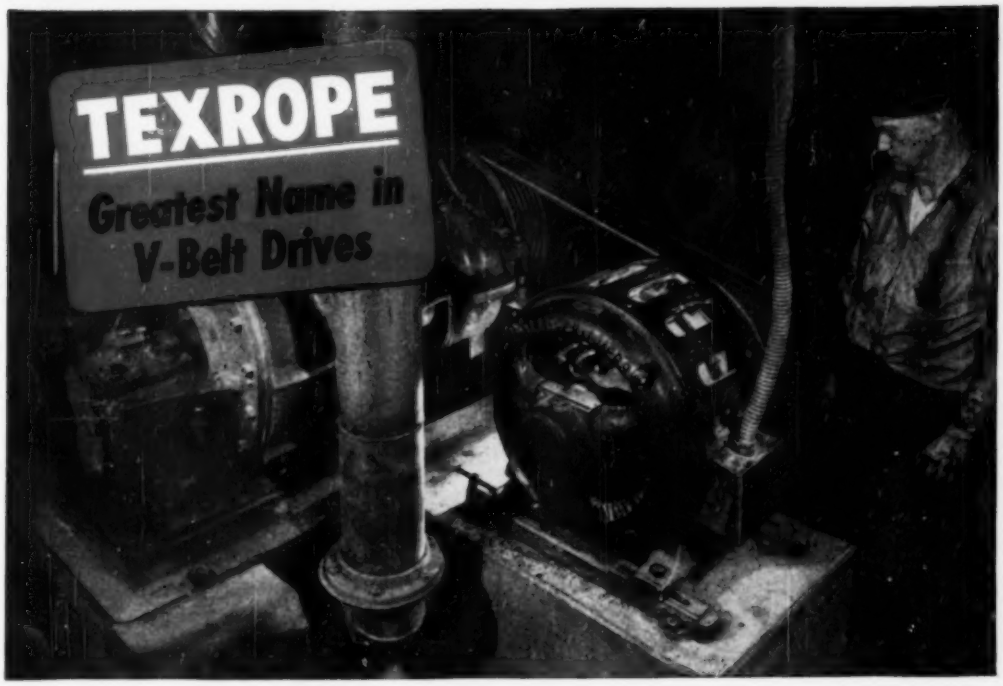
Among the problems receiving consideration are safe disposal of empty insecticide containers, most effective method of displaying warnings on tank cars, and revisions of warnings for carbon tetrachloride, acetic acid, acetic anhydride, chlorinated naphthalene, and tetraethylpyrophosphate. The hazards in using synthetic resin compositions and barium salts will also be investigated.

The next meeting will be held in May at the General Brock Hotel, Niagara Falls, Ont.

To Cut Export Losses

The Maritime Association of the Port of New York has appointed a nine-man committee to study means of preventing staggering annual losses in export shipments which are attributed to inadequate packaging, excessive handling abuses, etc. Due to this con-

(Continued)



"No Upkeep Now"

BELT SLIP ELIMINATED, BEARING DAMAGE STOPPED, POWER WASTE ENDED WHEN *TEXROPE* V-BELT DRIVE REPLACES FLAT BELT.

THAT'S REPORT of W. Pfeil, Chief Engineer of the Best Brewery, Chicago, makers of Embassy Club beer. "This blower sucks grain into our storage bins. The old flat belt was twelve inches wide on twenty foot centers. It was heavy and absorbed a lot of power. Grain dust made the belt slip constantly. We had to keep it so tight that it ruined bearings or slipping would burn the belt. Maintenance cost us hundreds of dollars a year.

"Four years ago an Allis-Chalmers representative recommended this *Texrope* drive. It doesn't slip at all, doesn't hurt the bearings and we haven't spent a cent on it. I wish we had changed to a *Texrope* drive years sooner."

Money-saving performance like this is one of the reasons why more *Texrope* industrial V-belt drives have been installed since 1926 — when Allis-Chalmers originated the multiple V-belt drive — than any other kind.

The *Texrope* line gives you practically everything you need for any V-belt drive . . . V-belts, standard and *Vari-Pitch* sheaves and speed changers . . . all from one reliable source. You can engineer 90% of all V-belt drives yourself with the help of the *Texrope* Pre-engineered Drive Manual. See your A-C Authorized Dealer or District Office or write for Bulletin 20B6956. Also in Sweet's.

Texrope Super-7 V-belts result from the cooperative research of Allis-Chalmers and B. F. Goodrich; and are sold only by A-C dealers and offices. *Texrope* and *Vari-Pitch* are Allis-Chalmers trademarks. A 2641

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To guard products and machinery, and to insure good industrial housekeeping, this manufacturer of *Universal* toasters, waffle irons, mixers, heaters, irons and fans turns to Pangborn Dust Control to stop the Dust Hog.



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DUST CONTROL

dition, it is possible that unless export packages are improved, government will impose mandatory packing specifications.

The committee composed of shippers, representatives of steamship lines, and underwriters has been instructed to report their recommendations before **April 30.**

Poison Bill

Oregon Senate Bill 185, introduced Feb. 8, 1949, lists compounds which are classed as poisons according to hazard in two schedules: *A* and *B*. The label must contain the conventional skull and crossbones, name of compound and name of packer.

Poisonous compounds in Schedule A may only be sold by registered pharmacists. Methanol and denatured alcohol must be labeled as prescribed by federal regulations and sales of under a gallon are limited to registered pharmacists. Anti-freeze is exempt from these regulations when poured directly into an automobile radiator.

This bill has been referred to the Oregon senate's committee on medicine, pharmacy and dentistry.

ASTM Meeting Scheduled

The spring meeting of ASTM Committee D-10 on shipping containers will be held on May 9 and 10 at the Claridge Hotel, Atlantic City, N. J. This meeting is planned to coincide with the AMA Packaging Conference for the convenience of members who plan to attend both.

Although many standard tests have been published, the committee still has a full docket. As a substantial part of the work is of a pioneering character, preparation of standards is well worth the time devoted to it.

T. A. Carlson of the U. S. Forest Products Laboratory is chairman and Earl R. Stivers of the Package Research Laboratory is committee secretary.

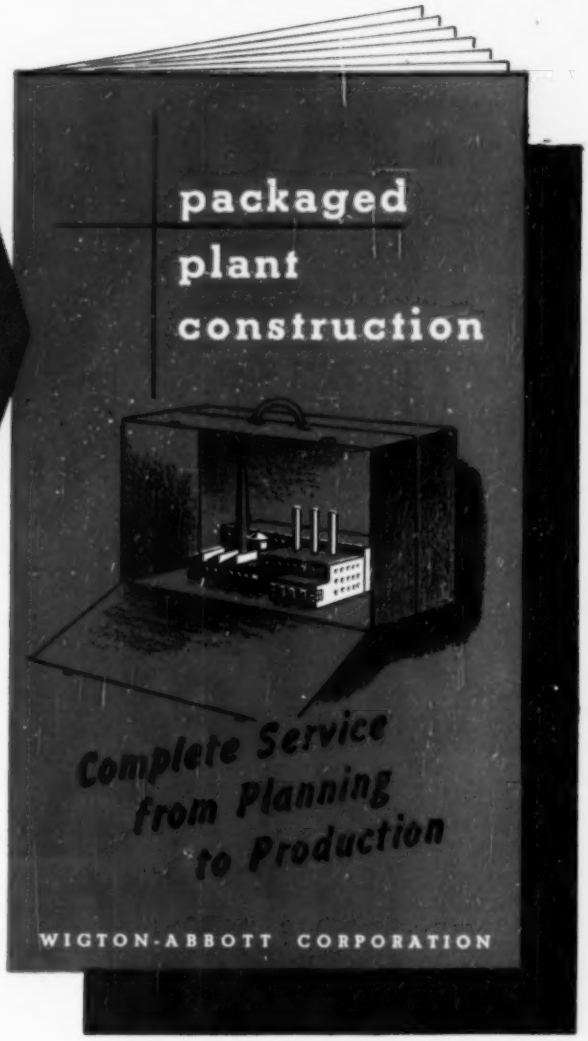
AMA Packaging Conference Coming in May

Concurrent with the National Packaging Exposition, the American Management Association's annual conference on packaging, packing and shipping will return to Atlantic City Auditorium this year, on May 10-13. The packaging council has prepared an interesting program of subjects of timely interest under the direction of J. D. Malcolmson, vice president of AMA and in charge of its packaging division. —*End*

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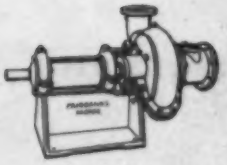


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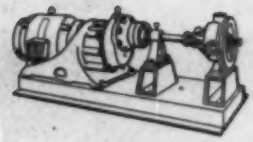
DESIGNERS • • • ENGINEERS • • • CONTRACTORS **PLAINFIELD, NEW JERSEY**



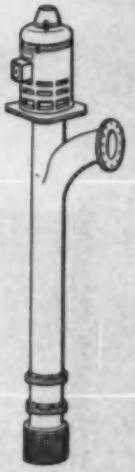
Paper Stock Pumps



Frame Constructed Rotary Pumps

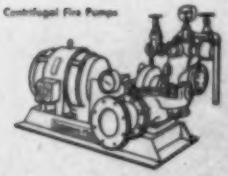


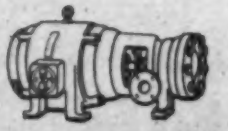
Rotary Pumps with Geared Head Motor Drive



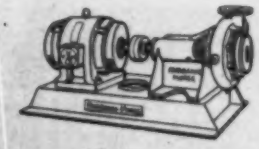
Vertical Propeller Pumps

Centrifugal Fire Pumps

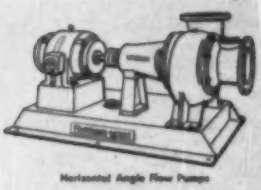




Two-Stage Bullhgather Pumps



Horizontal Sewage and Trash Pumps

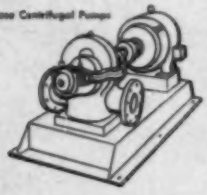


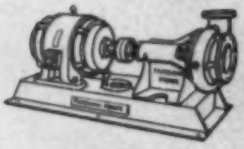
Horizontal Angle Flow Pumps

Vertical Close-Coupled Sewage and Trash Pumps



Split-Case Centrifugal Pumps



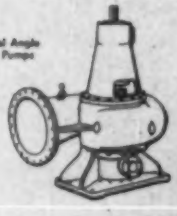


Base-Mounted Centrifugal Pumps



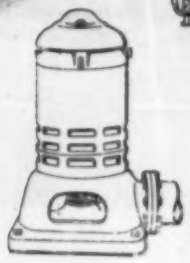
Vertical Sewage and Trash Pumps

Vertical Angle Flow Pumps

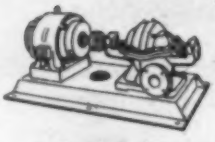




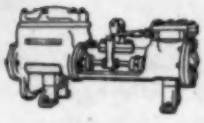
Bullhgather Centrifugal Pumps



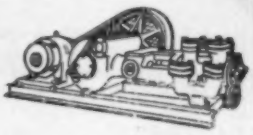
Deep Well Turbine Pump



Two-Stage Centrifugal Pumps



Duplex Steam Pumps



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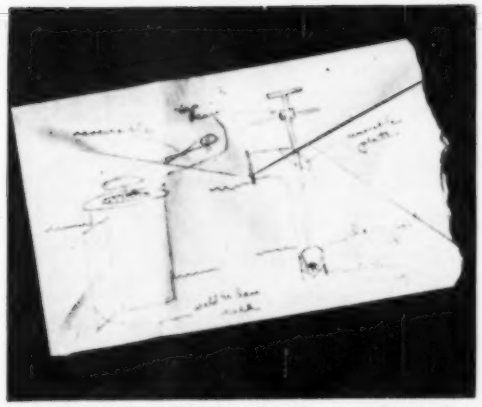
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A name worth remembering

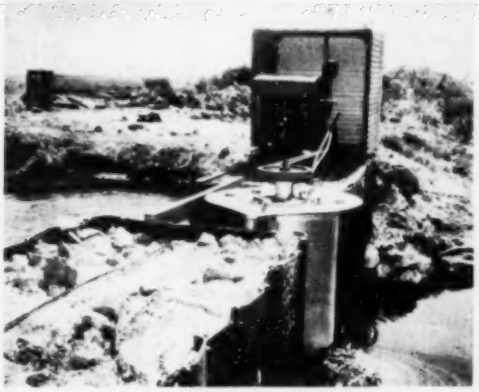
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Men, Machines and Methods

ROGER WILLIAMS, JR., *Assistant Editor*



CRUDE DRAWINGS are often all engineers have to start with in designing . . . .



. . . . **FINISHED EQUIPMENT** like this—yet the operators yell when it won't work at once.

There is Such a Thing as Mechanical Research Also; More Companies Might Try It

GEORGE CAWLEY

To the layman the word research calls up a picture of an earnest young man surrounded by retorts, Ehrlenmeyer flasks, burettes and test tubes, or else of men and women in white peering through microscopes or tending extensive menageries of rats, guinea pigs and white mice. This narrow view of the scope of research is not confined to the layman alone, but can be found to a surprising extent in industry.

There are concerns that have impressive research departments whose chemists labor for long periods without censure, even though their results turn out to be negative, yet these same concerns expect that any mechanical device designed for some new operation will function perfectly the minute it is installed in the line. Parenthetically no criticism of research chemists or chemical engineers is intended. The work of producing a machine for a change in process or for a new product is turned over to the engineering department or possibly the master mechanic with the belief that a freehand sketch or two holds all the answers. Many readers, no doubt, will regard this picture as far fetched; but experience has shown it to be true in too many cases.

Many a promising, even brilliant first attempt has been condemned, and has ended in the junk pile because it failed to operate to the satisfaction of the operating department when first put into regular operation. The chemist or chemical engineer is familiar with the steps from test tube to pilot plant to volume production; and of the many pitfalls in this line of progress. The nearest thing to a test tube the engineer has is the drawing board. A good designer can certainly foresee much that can happen in a machine by reviewing the scale drawings and his calculations; but too frequently he has to work more or less in a vacuum. His office is a separate unit in the organization. The production department, naturally, does not want its schedules going awry, and will not look with favor on having its costs increased by experiments made on its plant, because production generally will not be credited with the value of the experimental work. In too many cases experimental work will be done in one plant and if successful will enable another plant in the same company to operate more efficiently. The former unit does not get proper credit for the latter's increased efficiency, though saddled with the costs of the experimental work, a situation that does not lead to a local superintendent's looking with any enthusiasm on being a guinea pig.

The engineer often does not have too free a hand with the mechanical forces of the plant. In most normal organizations the shops are loaded to capacity with maintenance work and research becomes an added burden, so a designer is liable to give up in sheer frustration.

There is a rather prevalent belief that the performance of a machine can be predicted accurately from draw-

George Cawley is a development engineer specializing in development work on automatic machinery for chemical processing. He resides in Montclair, N. J.

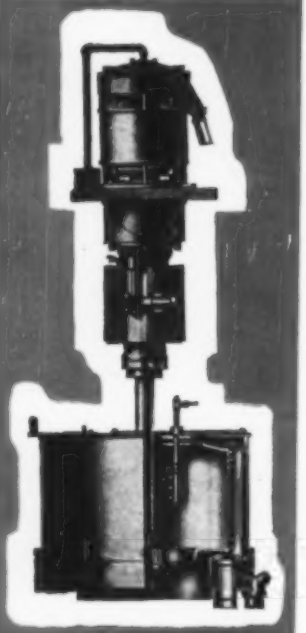
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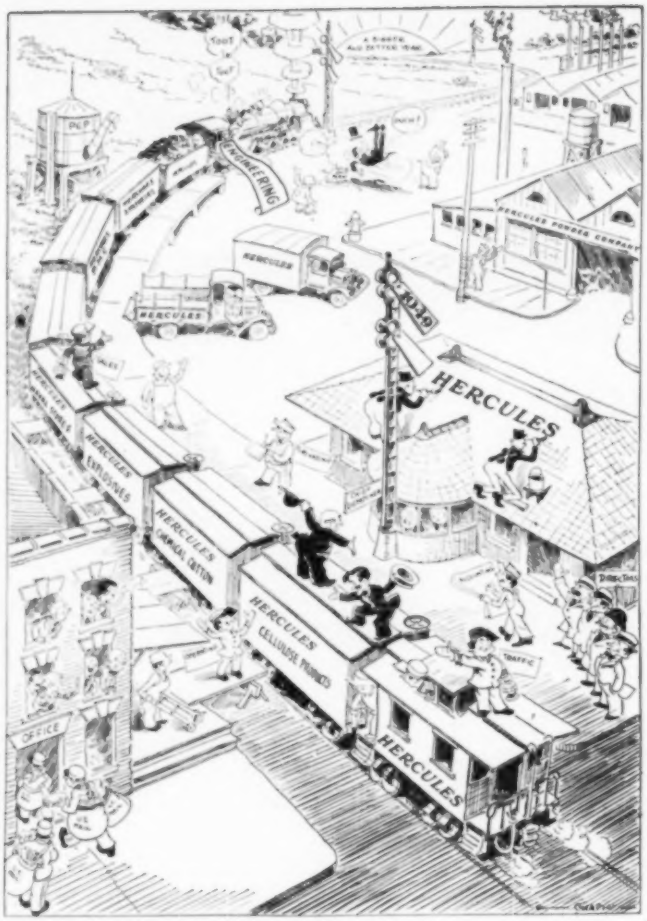
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ENGINEERING SETS THE PACE

Hercules Powder, we are gratified to find, really appreciates its engineers. The above illustration is taken from a recent issue of one of their house-organs. As the cut shows, the Directors stand proudly by, Sales rides the train, but note who drives the train—engineers!

M M AND M, *cont. . .*

ings, sometimes even a sketch is considered to suffice. Concerns whose principal product is machinery, naturally, are seldom guided by such a theory. It may be argued that computation should provide the answers if the designer be competent. To solve many simple plant problems solely by means of drawings and figures would require the services of a number of brilliant scientists, who should be better occupied. The installation of a simple conveyor may not be satisfactory until a number of changes from the drawing board design have been made, a fact experienced operators accept, though with resignation. If the cost of this period of alteration were accepted as a research cost, a healthier attitude would prevail throughout the whole organization.

So many people think that research work can be carried out only in the rarefied atmosphere of the graduate school, and cannot reconcile its being performed in the presence of overalls and monkey wrenches. True, development work can frequently fail if there is an unwillingness to face the fact that its cost must be met frankly.

If the higher officers of an organization are really aware of the importance of mechanical research and also of the fact that little can be done without cost, a good start has been made. With someone in the upper brackets

actively interested, a formal organization is not always a necessity. Teamwork between engineering and production departments can produce exceptional results without the establishment of a research staff. It is not wise to trust to luck that efficient combinations of individuals will form of themselves however, although this sometimes happens. To pick out the components of a development team will probably take time, for the glib individual and the enthusiast who follows too many trails may disrupt the program before their failings are discovered, though at first they may appear the most valuable.

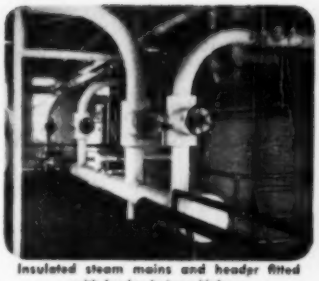
Of great importance to the success of the work is fairness on the part of the higher officials. Realization must exist that development work is a calculated risk, and failure after honest efforts calls for sympathy, not censure; and in case of success, care should be taken to bestow credit because of achievement and not because of rank. Costs must be faced frankly, and this can only be done if those in the upper brackets of the organization have the vision to see that the concern as a whole is benefited.

The engineer can help himself by getting as much information as possible in advance from the production departments, but here he is liable to be hampered if there is not executive encouragement. He should remember that the operating departments will have to make his designs work and the maintenance department will have to keep them running. Before he has gotten too deep in design, he should review the aim of his work to be sure that a wider view of the whole process will not suggest changes that will make his first project unnecessary, or call for its radical revision. He should keep his design as simple as possible, and having started trial runs, he should make one change at a time and not make further alterations until the effects of the first change are fully evaluated.

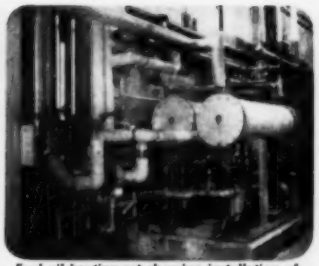
A good place to start mechanical research is in the advertising pages of technical magazines. It may be that some pet project will fall through because the contemplated device is already in manufacture, but the elimination of unnecessary labor is clear gain. If the whole sought-for apparatus cannot be purchased, very often some major part can be. Valuable leads can often be obtained from the working force, and all the advice it is possible to obtain should be had, and no source should be scorned.

Yes! There is such a thing as mechanical research and it should be open to all from the humblest mechanic and operator to the Ph.D.

—*End*



Insulated steam mains and headpr fitted with Lunkenheimer Valves.

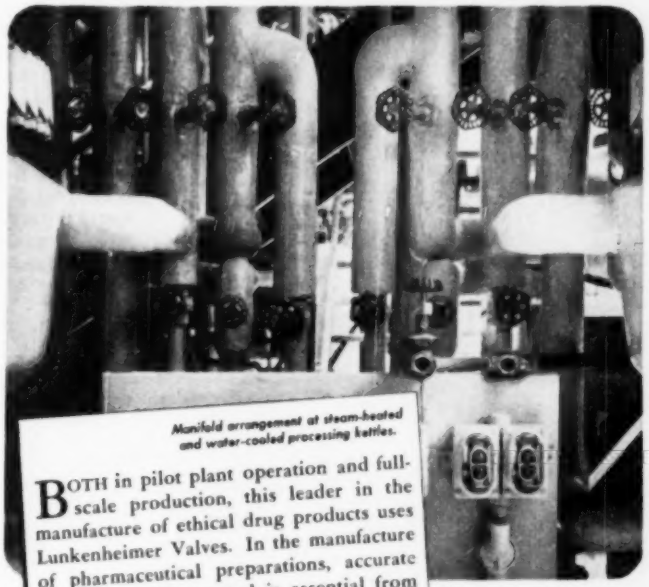


Fuel oil heating set showing installation of numerous small Lunkenheimer Valves.

modern pharmaceutical manufacturing Controlled with

LUNKENHEIMER VALVES

...in plant of G. D. Searle & Co., Chicago



Manifold arrangement at steam-heated and water-cooled processing kettles.

BOTH in pilot plant operation and full-scale production, this leader in the manufacture of ethical drug products uses Lunkenheimer Valves. In the manufacture of pharmaceutical preparations, accurate and dependable control is essential from raw materials to finished products, and in the handling of process steam and refrigerants as well.

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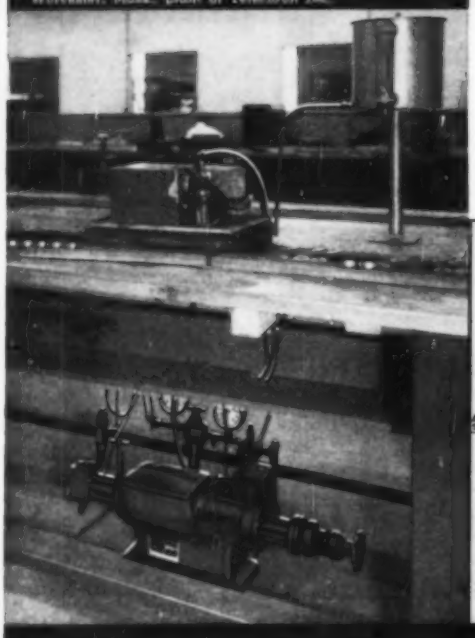
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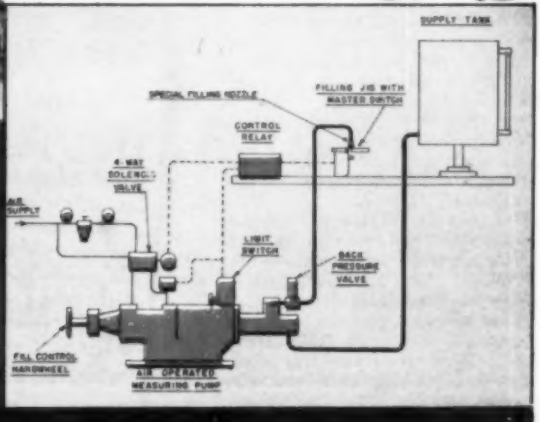


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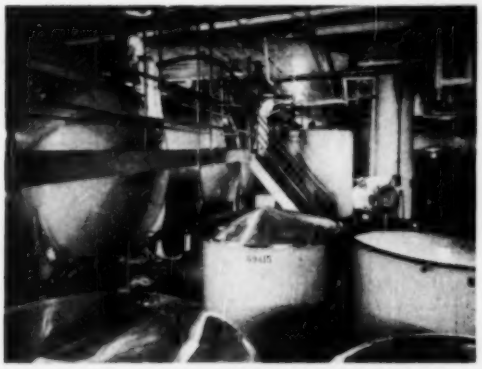
Technical service representatives in principal cities of the United States, Canada, Mexico and other foreign countries.

Chemical Engineering News

RICHARD F. WARREN, Assistant Editor



Chemical manufacturing section sports modern control room.



Liquid processing section uses this glass-lined equipment.

Smith, Kline & French Open Large New Unit in Philadelphia

The modern new $7,000,000 building of Smith, Kline & French Laboratories, manufacturers of pharmaceuticals, was officially opened in March when the firm played host to its employees' families. Over 3,000 persons toured the impressive, five-story building, which contains approximately 400,000 sq. ft. The guests viewed research laboratories, manufacturing units and administrative offices in actual operation. The building and grounds occupy a full city block within six blocks of the heart of Philadelphia.

The importance the company attaches to scientific research is evidenced by the five-fold increase in space over former quarters allocated to this phase of the business. Scientists now have at their disposal laboratories containing the most modern types of scientific equipment.

To insure a maximum degree of efficiency and teamwork among scientific personnel, the progressive development of a new therapeutic agent from chemical synthesis through animal testing, pharmacy and bacteriology was kept in mind in drawing up plans and over-all design of the research laboratories. Hence, organic chemistry, pharmacology, research analytical and biochemistry laboratories are placed together on the fifth floor, and pharmaceutical chemistry, bacteriology and physical chemistry on the fourth. The fourth floor also contains the medical and research literature departments and a research library.

From the chemical manufacturing section come the synthetic organic chemicals that are active ingredients for many of the firm's pharmaceutical products. The chemicals are produced from processes worked out in the SKF research laboratories. As a result, practically all of the equipment is designed to suit the firm's requirements as to size and operating conditions. Here the raw materials and chemical manufacturing equipment are concentrated in one unit. Use is made of the basement directly below the main room of the section as a solvent storage area. In order to facilitate transferring materials from one floor to another, the chemical manufacturing section has been provided with its own elevators. A special room, built to eliminate dust and dirt, was provided for the electrical switches and controls which heat each unit in the department.

Some of the finished products flow by gravity through stainless steel pipes from the third floor, where they are manufactured, to the packaging section on the second floor. After the products are conveyed down the automatic packaging line, the filled cartons are sent on chutes to the first floor, where they are made ready for shipping. As in the various research laboratories, constant temperature rooms have also been provided in the manufacturing units for storing of ointments and certain raw materials. Tablet coating is done in a specially designed room with its separate air-conditioning and dust collection system.

Lithium Salts Withdrawn On Drug Agency Finding

Use of lithium chloride as a substitute for salt in "salt-free diets" has been condemned as a dangerous practice by Food and Drug Administration. Manufacturers selling this chemical for drug distribution under various trade names and for use in bakeries for salt-free bread have stopped sales and recalled dealers stocks.

Use of such material to make salt-free diets more palatable has not been widespread, but has been sufficient to result in the claim that these materials have led to injury and, in a few cases, death of patients using them. The early symptoms of lithium chloride poisoning are very similar to those of the heart and kidney diseases which have required salt-free diets. This similarity is said to make cases of lithium chloride poisonings difficult to identify.

Future use of any such chemicals for diet amendment is to be controlled at least temporarily under the regulations for new drugs. By this means Food and Drug Administration hopes

(Continued)

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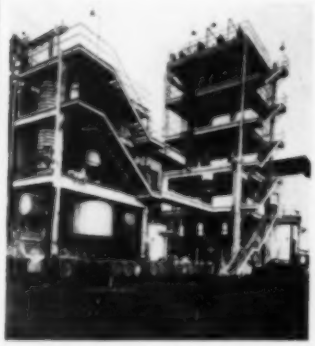
Be sure to have a copy of the latest CESCO *Catalog—*



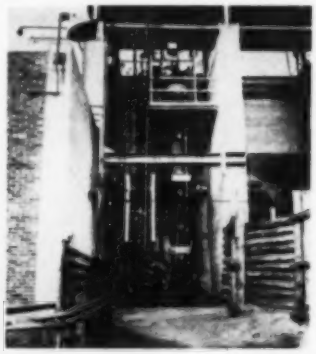
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CESCO FOR SAFETY

to prevent the inadvertent use of dangerous chemical combinations. In order to qualify under such regulations rather rigid tests by toxicologists and critical clinical reviews by specialists will be required.



First high pressure acetylene plant in this country. It's at Grasselli.



Vinylation tower at new unit embodies many new safety devices and techniques.

Reppe Type Acetylene Chemistry Plant Built by General Aniline

General Aniline & Film Corp. formally started operations of its new high pressure acetylene pilot plant last month at Grasselli, N. J. Here derivatives of acetylene will be produced under high pressures and elevated temperatures.

The technique permitting the safe use of acetylene under high pressures and temperatures was developed in Germany during the last war and has been extended and improved by General Aniline chemists at Grasselli and at the company's central research laboratory in Easton, Pa. Briefly it consists of two methods, one involving the dilution of acetylene with an inert gas and the other, wherein acetylene is reacted in what is essentially small-bore equipment providing a minimum of free space for gases to collect.

In its new pilot plant, General Aniline has not only widened the scope of acetylene reactions but by the development of new processes and the installation of extensive instrumentation with remote controls, has reduced the hazard to a minimum.

Planning and construction of the plant and the design of specialized equipment, including large and small explosion barricades, operating aisles for remote control, pressure exhaust system and complex instrumentation constituted a major engineering project. Reaction equipment is made to withstand tremendous overloads of pressure and is operated behind reinforced concrete walls and thick steel plates.

Work now being carried on involves two processes, vinylation and ethynylation. The vinylation products include methyl, ethyl, butyl and isobutyl vinyl ethers. One polyvinyl methyl ether has the unique property of being soluble in cold water and insoluble in warm water. Others have equally interesting characteristics.

Another of the compounds, polyvinyl pyrrolidone, a product of both vinylation and ethynylation, soluble alike in water and organic solvents, was used by the Germans as a substitute for blood plasma, which suggests interesting possibilities in the pharmaceutical field.

Dr. Hans Beller, manager of General Aniline's special products department, stated that the high reactivity of acetylene under pressure makes it perhaps the most versatile tool available to the organic chemist and that for this reason it is impossible to predict with much hope of accuracy the full extent to which acetylene derivatives may contribute to the future economy.

Standard of California Opens New Wax Plant at Richmond

More than 45,000,000 lb. a year of refined wax can be made at the new plant of Standard Oil Co. of California at Richmond, Calif. The $3,750,000 unit was just recently completed. It will cater to Pacific and western markets.

The plant will turn out refined

wax of three grades: (1) a pliable, low-melting point product of 125-130 AMP (American melting point); (2) a medium melting-point grade; and (3) a high melting point wax for specialized purposes. It will be shipped in 10 lb. slabs, 100-lb. cartons of slabs; 220-lb. bags of slabs, as loose slabs in paper-lined box cars, and in steam coil tank cars direct from the refinery.

About 29 percent of the plant's output—up to 13,000,000 lb. annually—will be the low melting-point grade that goes largely into milk cartons. Around 54 percent will be of medium melting-point for waxed paper which has a wide range of use in industry and for the packaging of food and other products.

Starting material for the unit is slack wax—a mixture of oils and waxes recovered as a byproduct in Standard's new lubricating oil plant at Richmond. This is separated by heat into three different melting-point fractions. All oil is then taken out of the wax by chilling, solvent extraction and filtering. The wax is finally filtered through clay to give a white semi-translucent product that is odorless and tasteless.

Ammonia Surplus Threat Stirs Up Complications

A possible surplus of ammonia this summer stirs hope among users and fear among producers. But this appears to be far more than merely trade concern as government, organized agriculture, and other non-chemical groups are importantly affected.

No one can forecast beyond July 1 as to whether important buyer's market factors are just entering. But certain complications are clearly recognizable even in April, among them the following:

1. Fertilizer consumption usually advances or recedes with changing gross cash income of farmers. The decline in cash income from 1949 crops, as compared with 1948, is read by many to forecast definitely a decline in fertilizer usage.

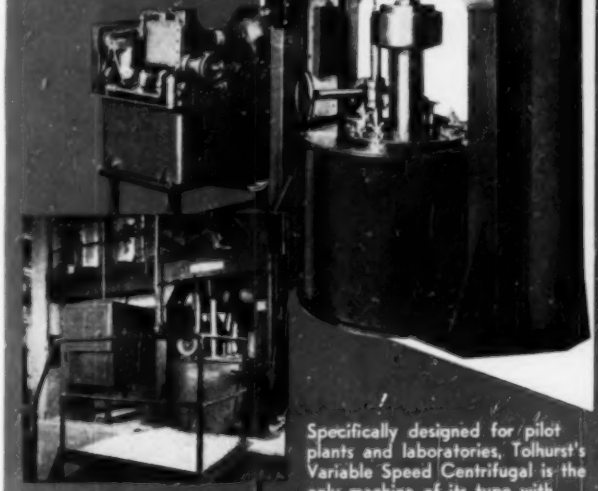
2. Abundance of phosphate is promised both as rock and as superphosphate. Normal and double strength super will both be available throughout the country to meet expected demands, but generally without burdensome surpluses, experts seem to agree. Potash supplies will be close to balance or with a slight surplus for some parts of the country if promised imports from Europe resume. This concentrates the fertilizer problem in the field of nitrogen supply.

3. Export demand for nitrogen from U. S. in the Western Hemisphere is

(Continued)

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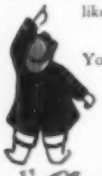


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Business Economy for Industry the World Over

ARE you in a position to definitely measure the over-all cost of destruction, should fire reduce your plant or property to a shambles of twisted steel or broken concrete? We doubt it, for fire loss represents considerably more than is visible in the destruction of buildings, equipment and records. It means the interruption of production and service, the reduction of assets and increased liabilities. It means temporary and perhaps permanent loss of customers. In short, it could well mean the financial ruin of your entire business enterprise.

On the brighter side of this picture of fire destruction stand *Automatic Sprinklers*, industry's most effective weapon against fire. For, *Automatic Sprinkler* systems are supersensitive to the very indication of flame. They make the fire extinguish itself, even before it can make headway. And, on the financial side, *Automatic Sprinklers*, like any other capital asset, can be amortized over a given period of years, with their initial cost ultimately taken as an operating expense.

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News, cont. . .

growing, but not at a rapid rate despite claims of some Latin countries that they never have had enough of the nitrogen carriers since the war began.

4. Supplies of fixed nitrogen in Europe are growing as productive capacity is restored or new is built. Reliable official estimates indicate production in fertilizer year 1948 as 1,200 thousand of metric tons of contained nitrogen. Comparable estimates for fertilizer year 1951 forecast production of 2,000 thousand in the Western European area. This estimated production is about equal to the requirements of the same countries forecast for fertilizer year 1951. Secondary results expected are as indicated in the next two paragraphs.

5. Western Europe will become self-sufficient as to nitrogen if these forecasts prove right. This means either that Army supplies to Occupation Areas will be unnecessary; or other European nitrogen products will be released for export. In either event United States production will find new competition at home or abroad.

6. Some believe that the most profitable result will be continuance of Army production for Occupation Areas will be unnecessary; or other European

(Continued)

CONVENTION CALENDAR

American Ceramics Society, national meeting, Netherlands-Plaza Hotel, Cincinnati, April 24-28.

Electrochemical Society, spring meeting, Benjamin Franklin Hotel, Philadelphia, Pa., May 4-7.

American Institute of Chemical Engineers, regional meetings, Tulsa, May 8-12.

American Oil Chemists Society, annual meeting Hotel Roosevelt, New Orleans, May 9-10.

Instrument Society of America, spring meeting, Royal York Hotel, Toronto, May 12-13.

American Association of Cereal Chemists, annual meeting, Statler Hotel, New York, May 16-20.

Society for Experimental Stress Analysis, spring meeting, Hotel Statler, Detroit, May 19-21.

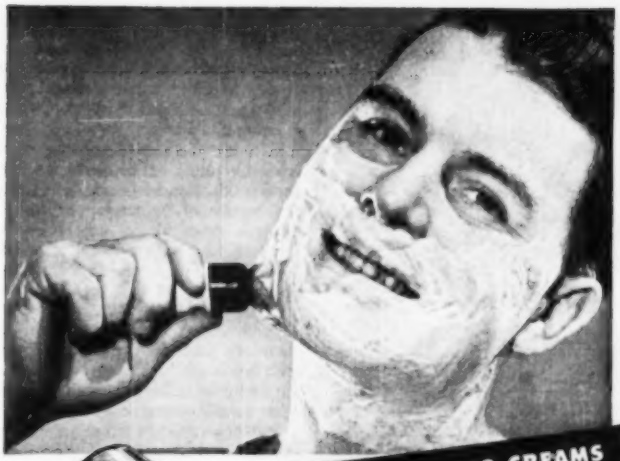
Manufacturing Chemists Association, annual meeting, Skytop, Pa., June 2.

American Institute of Chemical Engineers, regional meeting, Mount Royal Hotel, Montreal, September 6-8.

American Chemical Society, 116th national meeting, Atlantic City, N. J., September 18-23.

Packaging Institute, annual forum, Commodore Hotel, New York, October 24-26.

22nd Exposition of Chemical Industries, Grand Central Palace, New York, November 28-December 3.



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...TO SULFA DRUGS



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Technical GLYCERINE NEWS

WANT THE BEST VANISHING CREAM? Recent examination of some hundred formulas for vanishing creams showed that the most successful cream contained the highest percentage of glycerine. (D-1)

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RELIEF FOR MYCOTIC VULVOVAGINITIS. Treatment of mycotic vulvovaginitis, generally unsatisfactory in the past, may be improved by a new jelly containing calcium propionate, sodium propionate, propionic acid, and glycerine. (D-3)

★ ★ ★

NEW ANTISEPTIC SCALP WASH. Infectious conditions of the scalp are said to be treated effectively by a new wash preparation containing glycerine as an essential ingredient. (D-4)

★ ★ ★

GLYCEROL VISCOSITIES TABLE AVAILABLE. Miner Laboratories, headquarters for the Glycerine Producers' Association program of glycerine research, has prepared a table of viscosities of glycerol in aqueous solution from 0 to 100 per cent, at from 0 to 100 degrees C. You can obtain your copy by merely checking item D-5 on the coupon below. (D-5)

★ ★ ★

NON-SPLASH GLYCERINE DISPENSER. A new spigot glycerine dispenser is claimed to deliver a free and steady flow of liquid without splash or waste. (D-6)

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I should like to receive more information on the source of the items appearing in Technical Glycerine News. I have checked below those items which interest me.

☐ D-1 ☐ D-2 ☐ D-3 ☐ D-4 ☐ D-5 ☐ D-6

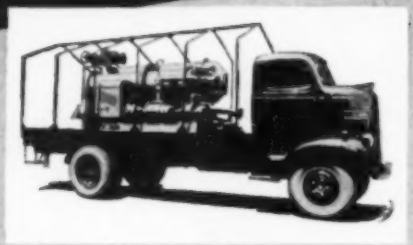
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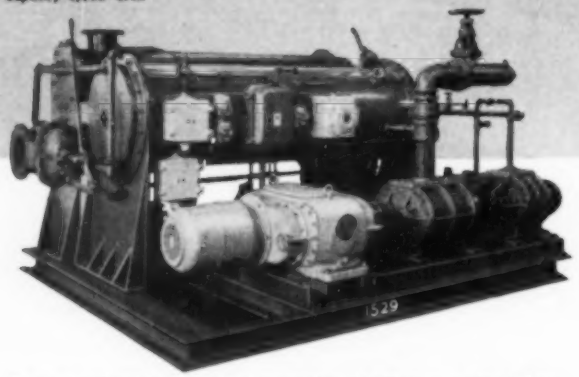
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Portable R-C Inert Gas Generator, of 15,000 CFH capacity, mounted on pneumatic-tired truck.

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Stationary R-C Inert Gas Generator mounted on steel base. Capacity 3,000 CFH.



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6. Extremely quiet operation.

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nitrogen products will be released for export. In either event United States production will find new competition at home or abroad.

6. Some believe that the most profitable result will be continuance of Army production for Occupation Areas and release of Norwegian or Italian nitrogen chemicals for export to the Western Hemisphere in order to get dollars. Greatest deterrent to this possibility is the fact that the European nitrogen chemicals, *at point of production*, cost more than comparable chemicals made in United States, despite our much higher wage rates. But the desire for dollars sometimes offsets other sound economic considerations.

7. Conversion of synthetic ammonia in the United States to solid fertilizer forms is now shifting to ammonium sulphate rather than ammonium nitrate. But new U. S. capacity to make synthetic ammonia will begin operation about July 1, largely offsetting this gain in conversion to sulphate.

8. Capacity newly available this summer will include 60,000 tons at South Point, Ohio; 60,000 tons at Etter, Tex., 30,000 tons at Hopewell, Va., and 20,000 tons at San Jacinto, Tex. These figures are short tons of contained nitrogen per year from facilities not operating during the past year or two for ammonia. The South Point facilities are not new, but are coming back from methanol operations as new methanol capacity has been completed there by Allied Chemical. The San Jacinto plant also is old, representing Hercules' removal of idle equipment from Missouri Ordnance Works as a service to the Army. The Etter increase is that pledged by Phillips Petroleum under its lease to the military. Only the Hopewell capacity is both brand new and strictly commercial.

9. Informed observers feel that Chile should be more worried than anyone else. Its supplies to Mediterranean and Near East areas will there find competition from nitrogen chemicals not hitherto available at any price. The Chilean nitrate bonus of some $10 per ton seems doomed.

10. If Chile can no longer get big price advantages in the Eastern Hemisphere, some forecast big new imports into the United States. This would provide new complications, especially for ammonium nitrate; and it also might further stimulate ammonium sulphate production from synthetic ammonia supplies.

11. Oriental need for nitrogen far exceeds any possible supply. Demand is much less, as few Far East areas

(*Continued*)

HOW BARRETT* PHTHALIC ANHYDRIDE HELPS

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PRODUCTION RATES and

↓ LOWER

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Resin manufacturers appreciate the operating economies that are made possible through the use of Barrett phthalic anhydride.

Barrett phthalic anhydride is available in 5-ply paper bags which assure adequate protection. The uniform weight of 80 lbs. in each bag may be used as the unit in formulation, and the phthalic anhydride can be fed directly into the processing equipment, thus cutting time of weighing or measuring.

Handling and mixing are facilitated because the convenient-sized flakes are smooth flowing, and contain a minimum of fines.

Moreover, Barrett phthalic anhydride is free from materials which cause premature gelling and foaming, and has a uniformly low maleic anhydride content which permits setting up formulae which do not require adjustments for varying maleic content.

Barrett phthalic anhydride is manufactured at two modern, strategically located plants which employ the most up-to-date technological advances and the newest type equipment.



5-ply bag construction insures adequate protection.

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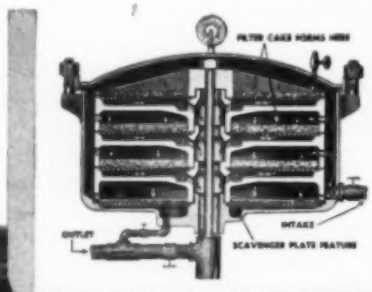
SPARKLER
horizontal plate
FILTERS

—preferred by many in chemical processing plants because of two outstanding features—uniform microscopic filtration—complete recovery of product.

Unlike the construction of some other types of filters the horizontal plates in the Sparkler allow the filter media to form in an even cake of uniform thickness, built up in a horizontal position without stress and therefore not subject to cracking or slipping under pressure, thus assuring uniform filtration either with intermittent or continuous flow.

Complete recovery of product is obtained by "wash through" or "blow down" of cake without removal from filter. The Sparkler scavenger plate, with independent control valve, acts as an auxiliary filter, filtering each batch down to the "last drop" leaving no holdover.

Plates are available in two thicknesses, deep plates for liquids carrying a large proportion of solids and shallow plates for polishing operations. When shallow plates can be used the filter area is increased within the same size tank.



This illustration shows a Sparkler filter installed in the plant of a large producer of insulating varnish. Standard models are available in capacities of 60 to 7,500 G.P.H.



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have the wherewithal to make payment in either dolalrs or goods convertible to dollars. Oriental demand is largely for ammonium sulphate because this is the traditional fertilizer for rice. Major effect of Oriental demand unquestionably will be also to stimulate ammonia sulphate as compared with other end products. Army plans are already well along in this direction.

12. Complete analysis of world nitrogen gets one even into rubber problems. Non-plantation production of rubber has been tremendously stimulated by high rice prices. Only generous fertilizer supply to increase the yield of rice from proved acreage is likely to lower the rice cost. Natives must tap trees and deliver a pound of rubber to get a pound of rice today. This abnormal relationship, despite stimulated rubber tree tapping, leaves many millions of natives on a starvation diet. This is a major item of concern to U. S. ammonia producers.

All these complications leave domestic synthetic ammonia makers in uncertainty. Forecasting precisely the trends is possible only in one or two features. Overall plans of nitrogen chemical makers therefore remain on a "best guess" basis. The imponderables and the unforecastable factors outweigh other influences.

New Bag Material Possible From Kenaf

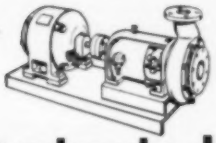
Kenaf is a new fiber crop in the Western Hemisphere which scientists of the Department of Agriculture believe may afford an effective substitute for jute fiber in cordage and industrial bagging. Trial plantings have been successfully made in Cuba and El Salvador. Further development is recommended on the chance that commercialization might afford a valuable alternate to burlap especially in sugar bagging. Cuba is suggested as a point of early development because of the existing market there for about $20 million in sugar bag materials yearly.

Fertilizer Shortage Blamed On Higher Freight

Large users of fertilizer chemicals in North Central States from Michigan to Missouri have complained to Congressmen that they do not get enough fertilizer chemicals, especially nitrogen carriers and potash. Several spokesmen of important farm bureaus and co-ops blame this scarcity on high freight rates which, they say, have caused suppliers of all materials, in-

(*Continued*)

THREE REASONS WHY THEY'LL GIVE YOU BETTER SERVICE . . .



❶ I-R Chemical Pumps are Protected against Leakage with the

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The patented LEAKOLLECTOR stuffing-box gland – an exclusive feature of all I-R chemical pumps – provides a simple and effective solution to the problem of pump leakage. It completely encircles the stuffing box, trapping all leakage so that it can be drained away for collection or disposal. The split gland is accurately fitted to both the inside and outside of the box, and will catch any seepage escaping between the shaft and packing, or between the packing and the bore of the box. The LEAKOLLECTOR is easily removed from the shaft for repacking the box.

In the complete line of I-R chemical pumps, you'll find a unit that's *right* for practically any application . . . a pump that is completely engineered for maximum performance, minimum maintenance, and high operating efficiency. For complete information, write to Ingersoll-Rand, today, asking for Bulletin 7095. Or, if you have a special pumping problem, contact your nearest I-R engineer. He will be glad to help you.

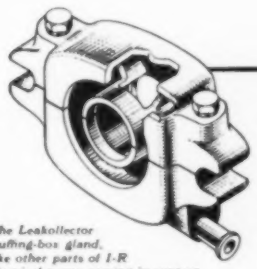
❷ They are ARMORED AGAINST CORROSION – with *IRCAMET*

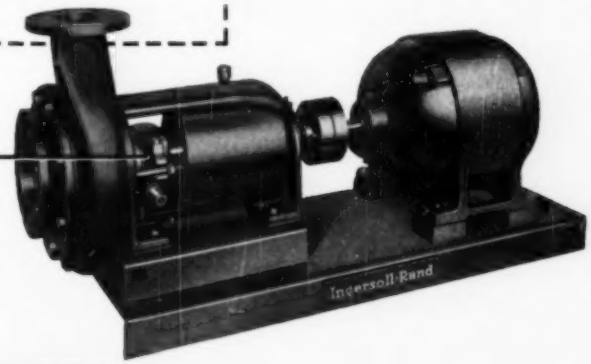
Ingersoll-Rand chemical pumps are built to stand up under the continuous handling of corrosive and abrasive liquids. All parts of the pump that come in contact with liquid are made of IRCAMET – a high nickel-chromium-molybdenum alloy steel developed exclusively by I-R for chemical pump service. Laboratory tests and years of field experience have proved its exceptional ability to resist the corrosive action of a wide variety of acids and alkalis. Other materials are available for special operating conditions. The entire unit is further protected against corrosion by *Panoflam*, a modified, synthetic, resin-base paint which is highly resistant to chemical action and to oil and grease.

❸ They are BUILT FOR EASY MAINTENANCE – and *LESS OF IT*

These pumps are ruggedly constructed to last longer on the job – and the simple design, with all parts easily accessible, means less "time out" for maintenance. The short, rigid stainless-steel shaft prevents impeller whip and eliminates many stuffing-box troubles. The suction nozzle is removable, permitting access to the impeller without disturbing the discharge piping.

The CAMERON SHAFT SEAL can be installed on all I-R chemical pumps to replace the conventional stuffing-box packing. It eliminates stuffing-box leakage and requires practically no attention or maintenance.





The Leakollector stuffing-box gland, like other parts of I-R chemical pump coming in contact with the liquid, is made of Ircamet.

I-R Chemical Pumps are of the centrifugal type, of simple cradle-mounted design, coupled to the driving motor. They are available in sizes to handle up to 4000 gpm at temperatures to 800° F.

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cluding superphosphate, to withdraw from markets formerly served before big increases in freight cost for delivery.

These spokesmen almost unanimously deny a desire for government allocation, but have offered no alternative. Chemical industry reply has been that an abundant supply, which is now forecast by many, will result in adequate deliveries even to points more remote from chemical plants.

Proceedings before the fertilizer sub-committee of the House of Representatives Committee on Agriculture are not expected to include recommendations for legislation. Representative Abernethy of Mississippi indicated that merely a review of the situation was contemplated in the mid-March hearings where these troubles were paraded by farm groups. Industry hopes that the Committee will wait until fall before announcing its conclusions, as by then an adequate supply, or even a surplus, of fertilizer chemicals is expected.

CCDA Holds Annual Open Meeting in New York

Toxicological safeguards in commercial chemical development were discussed at a symposium of the annual open meeting of the Commercial Chemical Development Association held at the Hotel Roosevelt, New York City on March 16th. The chairman, Richard W. KixMiller, director, product development department, chemical division, Celanese Corp. of America, in opening the meeting touched briefly on various items of interest in development activity.

Carbide and Carbon Chemicals Corp.'s practice in studying toxicological problems in new chemical development was outlined by Dr. H. F. Smyth, Jr., administrative fellow, Mellon Institute, Pittsburgh, Pa., in his paper "Range-Finding Tests—Toxicological Control in New Product Development."

In the second paper of the morning session, "Dermatitis Among the Public From New Fabrics, Dyes and Finishes," Louis Schwartz, M. D., consultant dermatologist, Washington, D. C., summarized dermatitis experience in the indicated fields, including both natural and synthetic fibers and fabrics in his presentation.

The afternoon session was a symposium on sales promotion and advertising in commercial chemical development. George King, industrial chemicals department, Atlas Powder Co., gave the technical sales manager's

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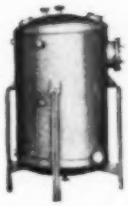
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LINED EQUIPMENT
. . . curbs Corrosive Acids



The "vessels" used in the process industries may range from a five-gallon receptacle to a cavernous tank. Details of construction may differ. But, when it comes to handling corrosive chemicals, much of this equipment has at least one thing in common . . . a lining of lead. Because *Lead blunts the teeth of hungry acids.*



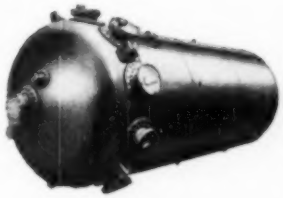
Leaders in the chemical processing field have something in common, too. They rely on the leader in lead products . . . National Lead . . . for their lead-lined and lead-covered equipment. They know that National offers . . . *and delivers* . . . not merely a mass of metal bearing outward resemblance to drawing and blueprint, but a piece of acid-handling apparatus that has the built-in ability to do the job it was bought to do. Into each unit goes the know-how, from drafting board to shop assembly, that makes the most of lead's resistance to chemical attack plus steel's resistance to physical abuse.



In National Lead's "Homogeneous" lead-lined tanks, drums, agitators, autoclaves and other items of this nature, the lead lining is bonded directly to the steel casing. An inseparable bond is created, a union of lead and steel that obviously will withstand higher temperatures than one in which solder is used.



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viewpoint using in illustration the advertising and development teamwork that marked his company's building of markets for mannitol and sorbitol. He said advertising is a very important aid to commercial developments in new chemicals. It supplements the available manpower for technical sales in putting forth the necessary effort for achievement of satisfactory results. Good advertising has a stimulating psychological effect on prospective customers and the general public. It also has powerful influence on the morale of the sales force whose efforts it supplements.

The viewpoint of a research director was given by Dr. Harlan Trumbull, assistant to the director of research, B. F. Goodrich Co.

Paul B. Slawter, Jr., vice president, House of J. Hayden Twiss, closed the technical program with an advertising man's viewpoint.

John B. Calkin, consultant, New York, N. Y., presided at luncheon and dinner. Dr. Paul C. Aebersold, chief, isotopes division, Oak Ridge operations, U. S. Atomic Energy Commission, spoke at length, at the luncheon, on the development of the isotope distribution program.

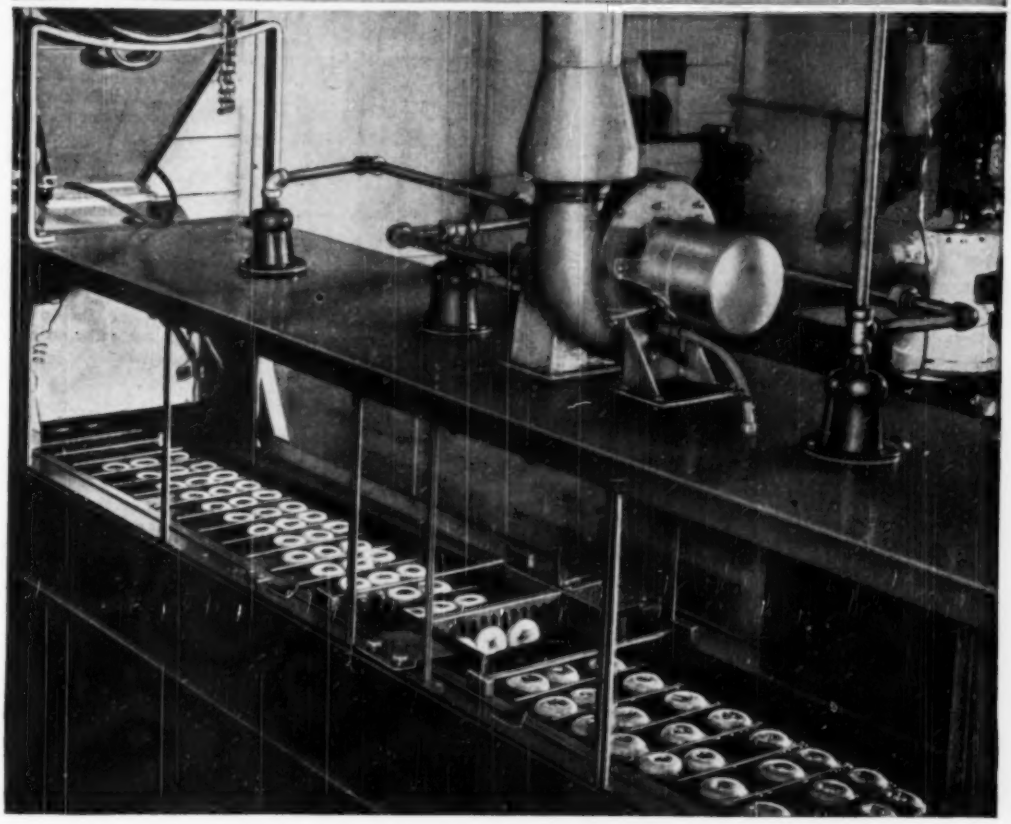
Dr. Lauren B. Hitchcock, president of CCDA, gave the dinner address on the subject of "Putting New Chemicals to Work." He opened with a summary of the huge expansion in number of marketed chemical products from a little over 100 in the early 20's to approximately 5,500 today, and estimated further that commercial but not yet listed products might number about 2,250 more. With this growth "we have gone far toward satisfying the minimum chemical requirements of our economy, and progress from here will trend more toward improvements in our current industrial arts toward competition between different products rather than between producers of the same product." Dr. Hitchcock outlined the stages in developing a new chemical to the commercial scale and the place of a commercial development department in the organization setup of a chemical company. After his talk he was presented with an inscribed desk set by the Association as a reward for his work in organizing the CCDA.

Shell Continues Fellowship Program for 1949-50

Shell Union Oil Corp. and associated companies will extend through the 1949-50 academic year the graduate fellowship program embracing 44

(Continued)

It's DOUGHNUTS to DOLLARS...



—fire won't live long here!

Ever watch doughnuts cooking to just the right shade of rich, tempting brown? Appetizing, isn't it? But . . . the job calls for hot oil—and every housewife knows that's one of the meanest of fire hazards.

The insurance company recommended CO_2—that's why Swans Bakery in Knoxville came to Kidde for an extinguishing system that would smash the threat of fire in doughnut baking machinery. If the hot oil flashes into flame, the *Kidde** system, *instantly* and *automatically*, shoots fast-acting carbon dioxide (CO_2) through Multijet Nozzles into the machine that bakes the flaky doughnuts. That's the end of the fire! And, of course, the dry, clean CO_2 *can't* damage the machine or spoil its contents. The doughnuts just go right on cooking!

You may never bake a doughnut in *your* plant—but you may have fire hazards that are every bit as tricky. Just ask a Kidde representative what to do about them!

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fellowships at 36 colleges and universities. The field covers chemical, mechanical, geological and petroleum engineering, chemistry, geology, geophysics and physics. Fellowships include tuition and fees of the recipient, a fixed stipend of $1,200 and an allotment of $300 to the department of study for equipment or other research expenses.

The program is administered by a committee of senior staff members representing Shell Union Oil Corp.; Shell Oil Co.; Shell Chemical Corp.; Shell Pipe Line Corp.; and Shell Development Co. Selection of the fellows and the type of research to be followed is determined by the department of study of the participating schools. Recipients of awards are under no obligation to the Shell group.

Morton Salt Rebuilding Refining Unit in Texas

Morton Salt Co. will move to its salt mine outside Grand Saline, Tex., the refining and related equipment damaged in a fire that occurred last fall at the former site of the plant within the city limits. The H. K. Ferguson Co. has the contract for rebuilding the equipment and has begun the engineering work for the project.

Texas Chemurgic Council Elects Officers

At the fourth annual conference of the Texas Chemurgic Council held in Houston last month, Victor H. Schoffelmayer was named president for the fifth consecutive time. E. B. Neiswanger of Corpus Christi, C. Cabanne Smith of Houston and J. R. Fleming of Weatherford were re-elected vice presidents.

Elmore R. Torn of Taylor, executive vice president and secretary, announced during the conference his decision to resign at the end of March. After that date, for reasons of economy, headquarters of the Council will be moved from Taylor to Dallas and come under the direction of Schoffelmayer. Torn has become a member of the board of directors, along with E. B. Davis, Luling and D. M. Williams, vice president of Texas A. & M. College.

Superphosphate Plant in Idaho Nears Completion

With the easing up of winter weather in Idaho, construction work has been resumed on the fertilizer

(Continued)



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When the demand is for a continuous, economical supply of air, the CP motor-driven O-CE COMPRESSOR is unsurpassed.

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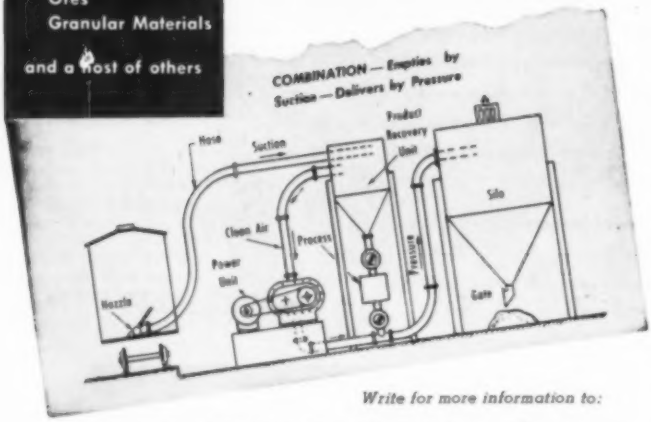
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Sizes and capacities depend upon the job and the material. Under usual conditions a 4-inch conveying pipe will move 5 tons of material per hour. The systems—either pressure, suction, or combination, as shown—are available for capacities from 1 to 100 tons per hour.

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Designers Manufacturers Erectors BULK MATERIAL HANDLING SYSTEM

plant of Gem State Phosphate Co. at Wendell. The main grinding and pulverizing unit has been completed, says President Charles T. Gates, and crushing machines are in place. The phosphoric acid plant is about half finished. Plans call for an output of 100 tons of treble superphosphate per shift, Gates said, and around-the-clock operations. The product will be marketed to the Idaho Farm Bureau Federation.

A laboratory has been completed, and Chief Chemist A. C. McDonald and his staff have begun experimental and test work. Also completed is an employees building and one of two spur lines to the plant has been laid by Union Pacific. Installed equipment includes two Williams standard roller mills and separator, a rotary dryer, crusher and roll mill and conveyors. An H_2SO_4 unit may be built, it was stated.

The Idaho Farm Bureau and Gem State own 8,100 acres of phosphate lands in southeastern Idaho. Heavy equipment is now scraping out ore for shipment to the Wendell processing plant.

Crosby Modernizes Naval Stores Units in South

Crosby Chemicals, Inc., has installed new equipment in its wood distilled naval stores plants in DeRidder, La., and Picayune, Miss., for the manufacture of additional lines of products. At each of those plants the company has put into operation two 2,000-gal. Dowtherm kettles and two Dowtherm boilers in order to produce heat treated rosins, heat treated limed rosins, gloss oils, ester gums, pentaerithritol ester gums and polymerized rosin.

A stainless steel fractionating column containing about 65 trays has been erected in the Picayune plant in order to manufacture narrow-cut fractions of terpene products.

Spencer Chemical Plans Further Expansion

Plans for construction of additional production facilities at Spencer Chemical's Jayhawk Works at Pittsburg, Kan., were revealed in an announcement last month by Kenneth A. Spencer, president of the company.

According to Mr. Spencer, the new expansion program will include additions to the plant which will increase anhydrous ammonia production capacity by an estimated 30,000 to 40,000 tons annually. The greater portion

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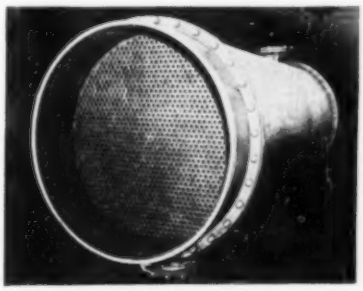
Cupro Nickel Condenser Tubing

Offers Many Advantages for Chemical and Petroleum Plants

In the rapidly expanding chemical, petro-chemical and petroleum refining industries, there is increasing demand for more corrosion-resistant tubing which will stand up under continuous operation in condensers, heat exchangers and pipe lines.

Although tubing of copper, brass, and bronze is successfully and widely used in most applications in these fields, there are special cases which require other types of corrosion-resisting alloys. Among these Cupro Nickel is fast gaining popularity because of its fine characteristics.

Properties of Cupro Nickel. Cupro Nickel, containing 70% copper, 30% nickel and approximately 0.5% iron, is considered the most corrosion-resistant and is most widely used. Cupro Nickel containing 80% copper, 20% nickel and approximately 0.5% iron is next in corrosion resistance. Recently an alloy containing 90% copper and 10% nickel, with 0.7% to 1.0% iron, has been developed, and is beginning to replace some of the other copper-base alloys in certain applications. The United States Navy specifies 70-30 Cupro Nickel for war vessels because of its excellent performance with clean sea water.



Duplex Tubing is used in this condenser, steel to the organic vapor side and a copper-base alloy to the water side. Courtesy Struthers Wells Corporation, Warren, Pennsylvania.

Cupro Nickel also withstands higher temperatures and pressures than most other copper-base alloys, which explains its use in feed water heaters. It leads the other copper-base alloys in resistance to stress corrosion or season cracking associated with the presence of moist ammonia gas.

Offsetting Destruction From Impingement Corrosion. The trend toward faster cooling of various liquids, vapors and gases, and greater velocities of cooling waters and liquids has increased damage from impingement corrosion and erosion. Since Cupro Nickel is superior to most other alloys in resisting this type of attack, we find it being specified where other metals fail prematurely.

Resistance to Ammonia. Because Cupro Nickel withstands attack from ammonia and other nitrogen compounds better than brass, it is being used where the presence of even small amounts of ammonia may contribute toward stress corrosion, season cracking or general corrosion. Where the water supply contains a high percentage of nitrogen-bearing substances, such as sewage, algae, etc., these may be responsible for the presence of ammonia in steam made from such waters.

For ammonia refrigeration systems steel stands up very satisfactorily against the ammonia side, but is not able to cope with corrosion from sea water or brine. Here Duplex Tubing is indicated, with steel to the ammonia side and Cupro Nickel to the water side. Cupro Nickel and other copper-base alloys withstand corrosion satisfactorily from such refrigerants as Freon, methane, butane and propane as well as methyl chloride, in the absence of moisture.

Resisting Corrosion From the Product Side. Cupro Nickel is very satisfactory for handling alkaline solutions in the absence of sulfur compounds. Alkali plants have had good results with Cupro Nickel tubing handling sodium chloride solutions in the production of sodium hydroxide and chlorine. It has been successfully used with naphtha and other petroleum products on one side and salt water on the other. In common with many other copper-base alloys, Cupro Nickel is satisfactory for use with a number of compounds such as acetic acid and acetates, aqueous hydrofluoric acid solutions, non-oxydizing salt solutions and gases such as fluorine, hydrogen, nitrogen, oxygen, and anhydrous hydrogen fluoride.

Consult Laboratory. No one alloy is best for all types of corrosive attack. Bridgeport manufactures a wide range of corrosion-resistant alloys, and the laboratory will be glad to assist in the selection of the one which will serve best. Contact the nearest Bridgeport office, and write for 120-page Condenser Tube Manual, containing much corrosion data, information about condenser tube alloys, valuable tables and other data.

• • •

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OF BENDIX AVIATION CORPORATION
Baltimore 4, Maryland

PRODUCT OF Bendix AVIATION CORPORATION

of the company's ammonia production is devoted to agricultural uses after being processed into ammonium nitrate fertilizer and ammoniating solutions.

The program also contains plans for increasing the production capacity for methanol.

Engineering work on the project has been completed, and contracts for construction have been signed. Construction work will be carried out by Quaker Valley Constructors, Inc., Pittsburg, Kan., and a contract has been consummated with the Chemical Construction Corp., New York, to act as architect engineers on a portion of the project. Construction work, Mr. Spencer said, will begin as soon as possible. Tentative completion date has been set for April 1950.

The program is a continuation of the company's over-all plans for increased production of agricultural nitrogen products and other basic chemicals.

An earlier expansion program at Spencer's Jayhawk Works, which included construction of facilities for the production of methanol, dry ice, ammoniating solutions, aqua ammonia, and refrigeration grade ammonia was recently completed. Construction of a formaldehyde plant in the Chicago area was also recently completed, and this plant is now in full operation. Formaldehyde, used primarily in the manufacture of plastics, is made from methanol produced at Spencer's Jayhawk Works.

In addition to the Pittsburg and Chicago plants, the company also operates a plant at Parsons, Kan., for graining ammonium nitrate solution into fertilizer. The company's products are distributed mainly in the midwestern area of the United States.

Briefs . . .

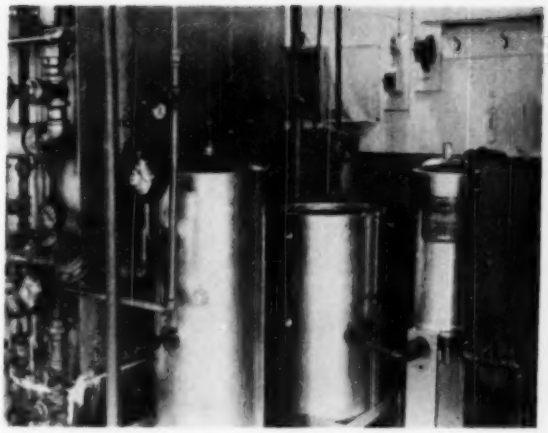
Oronite Chemical Co. has succeeded California Oil Co. as operator of the plant at Oak Point, La., which manufactures additives for lubricating oils. Both companies are branches of Standard Oil Co. of California.

Rust Engineering Co., Pittsburgh, Pa., has formed a new company, Rust Process Design Co., to take over the expanding activities of its process engineering division.

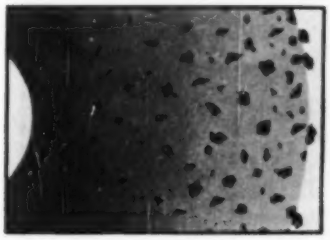
Union Carbide and Carbon Corp., New York, has announced that its subsidiary, Linde Air Products Co., has begun production of acetylene at a new plant in Albuquerque, N. M. —*End*

Filters that Make a Record for Fidelity

This machine applies a coating of cellulose acetate to discs made by Wilcox-Gay Corporation used for home recording. Cuno MICRO-KLEAN Filter removes contaminants, down to 1 micron in size, to insure the flawless coating needed for high-fidelity playback. MICRO-KLEAN cartridges have set new records by running longer without replacement.



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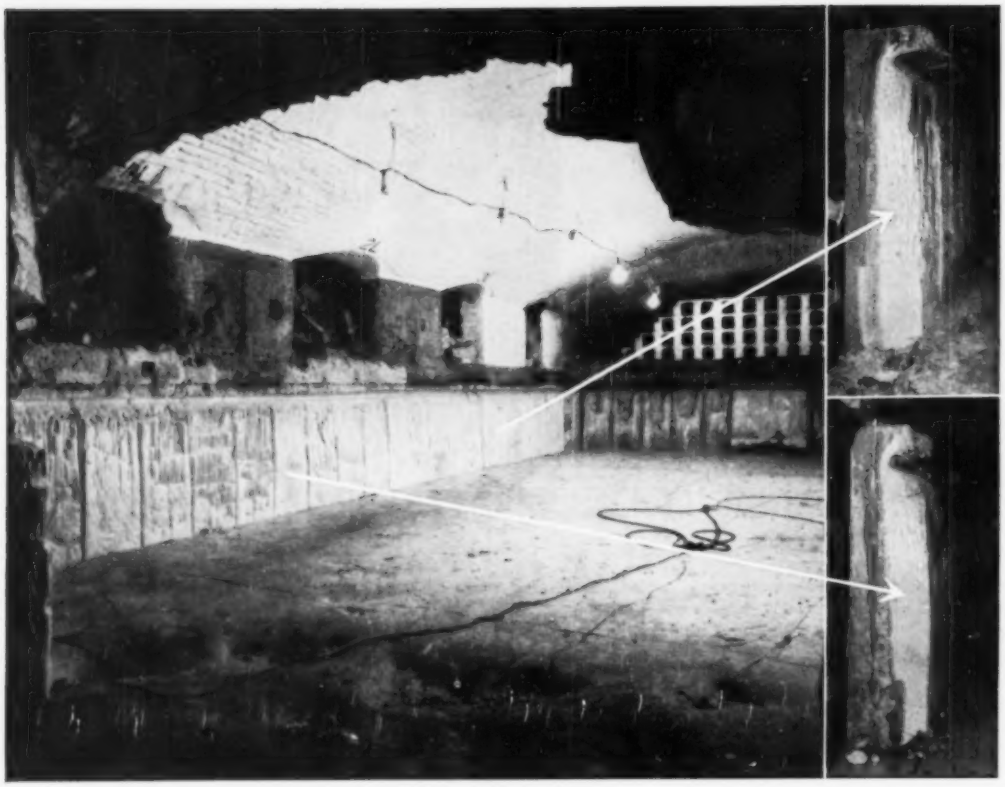
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The Corhart® Zac® sidewall above is part of a flint container tank which recently went down after a moderate run of 834 operating days (during which 75,675 tons of glass were pulled, for a tons-per-square-foot ratio of 110.5).

Please note the excellent condition and uniform "cut" of the Corhart Zac. The operator was convinced that these Zac sidewalls could have run for another year, whereas the Corhart Standard blocks in the bridgewall had already been patched.

On its *next* run, this tank will contain Corhart Zac in the melting-end bridgewall and backwall as well as in the sidewalls. Watch for another report —some three or four years from now!

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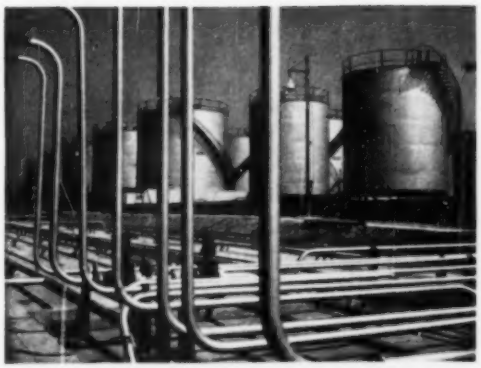
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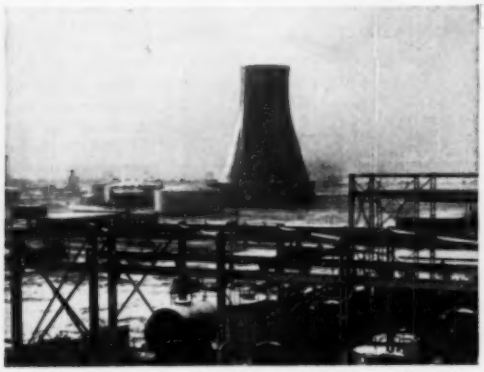
CORHART ELECTROCAST REFRACTORIES

News From Abroad

SPECIAL CORRESPONDENCE



Miles of pipe will carry products and raw materials to and from the great tank farm at the new Shell Project.



Reaction units nearing completion at Shell's new chemical works near Stanlow. A cooling tower rises in the rear.

British Shell's Petrochemical Plant Nears Completion

London—Due to be opened officially about midsummer of this year is Shell Petrolcum Co. Ltd.'s new petrochemical plant on an 85-acre site at Thornton-le-Moors, Cheshire, on the Manchester Ship Canal, close by Shell's specialized refinery at Stanlow.

The chemicals-from-petroleum project is due for completion somewhat earlier than the expansion of the Stanlow refinery which is also under way and which will eventually double that refinery's output of liquid detergents and wetting agents now being produced. That would bring Stanlow's production to some 50,000 tons a year.

The Thornton plant, when completed, will employ around 500, and its initial production was described as 24,000 tons annually, when the project was first announced. Chief items to be turned out to begin with are chemical solvents such as ketones, and isopropyl alcohol, which, it was estimated, would enable Great Britain to reduce her imports of these products from the U. S. by about $4 million annually.

Indian Rubber Output Drops in 1948

Bombay—Indian rubber production for 1948 has been reported as totalling 15,442 long tons, slightly below the 1947 output of 16,448 long tons, and latex production is set at 1,000 long tons compared with 1,300 long tons the year before.

Virtually all this rubber is consumed by manufacturers in India, led by Firestone and Dunlop tire factories.

Meanwhile, low rubber prices in Ceylon have brought warnings that the industry there is in danger of collapse. At the prevailing prices, which include No. 1 sheet quoted—at roughly 8 c., nearly 50 percent of the plantations are reported to be unable to meet even the costs of production.

Shell Expanding Refinery In Montreal

Ottawa—Shell Oil Co. of Canada, Ltd., soon will start construction of a new oil refinery in Montreal bringing Shell's crude capacity at Montreal to 10,000,000 bbl. per year or more than double perwar capacity.

The new facilities will include a catalytic cracking unit and a solutizer gasoline treating unit. Extensions and additions to the gas polymerization plant and gas recovery and treating facilities also are projected. Contracts for construction have been awarded to Arthur G. McKee & Co., Cleveland, and Fluor Corp. of Canada, Ltd., Montreal.



Argentina Starts Work on Five New Refineries

Buenos Aires—Construction was begun recently on the first of five petroleum refineries planned by the Argentine government. Contracts for three of them have been let to M. W. Kellogg.

At a ceremony marking the start of construction of the largest of the three Kellogg refineries, the head of the Argentine State Oil Monopoly (YPF), said that the new refineries would increase the government's refining capacity by over 50 percent raising it from 3 million cubic meters annually to 6.5 million.

The plant now goin ginto construction is one of three on which Kellogg was given a contract some time ago and which, presumably, payment was effected at that time before the present dollar shortage appeared in Argentina.

However, due to rising costs and the loss of value of the peso, the cost of the plant now going into construction has risen from 120 million pesos to

Continued

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233,904,518 pesos, according to the government announcement.

The refinery, which should be completed this year and put into operation in 1950, will have a capacity of 4,500 cu. m. per day. As production will be principally of aviation type gasoline, the site of the refinery was shifted from La Plata, Argentina, to near the new national airport, Ezeiza, outside of Buenos Aires.

One of the most serious drains on the exchange impoverished Argentine economy has been the approximately $2 million worth of oil and gasoline needed per week. Although Argentina gets approximately 50 percent of its crude petroleum from its own wells, the balance has to be imported. In the past both refined and crude fuel has been imported, but the government has hopes that with its new refineries only crude oil can be imported cutting considerably on the need for foreign exchange.

At the same time, oil production from Argentine wells is being increased and the YPF head stated that production was up 300,000 cu. m. in 1948 over 1947. A search for new fields is also under way.

Patronite Deposit Found In Quebec Area

Ottawa—A new industry may be started in the Province of Quebec in Canada with the discovery in what is described as "large quantities" of patronite (a vanadium ore) in that area, using this mineral in combination with available large supplies of hydroelectric power to manufacture paints, plastics, and other products.

A group of Montreal interests, known as Eugene Gagnon Associates and headed by Eugene Gagnon of that city, is working now closely with the Department of Mines in Quebec on this project, and it is hoped to start construction of a plant on a 400-acre property near Sherbrooke, Que., with the project estimated to cost approximately $1 million, including a 200,000 sq. ft. plant to be built and equipped on the mine property.

It is understood that the patronite ore will be mined by the open pit method and then pulverized in a crushing plant, undergoing thereafter a process using electrically-heated furnaces during which the ore is changed from black into any color desired, including rose, pale grey, mustard yellow and brown. About 500 men are expected to be employed at the Sherbrooke plant.

Australia Uses Novel Bulk Loading Technique

Melbourne—A novel method of loading bulk materials such as wheat, salt, chemicals or ore concentrates into cargo holds has been developed in Australia by engineers of the Grain Elevators Board of Victoria. Instead of dumping the material down the middle of the hatch, a telescopic split feed has been introduced which builds up two mounds from the bottom of the hold.

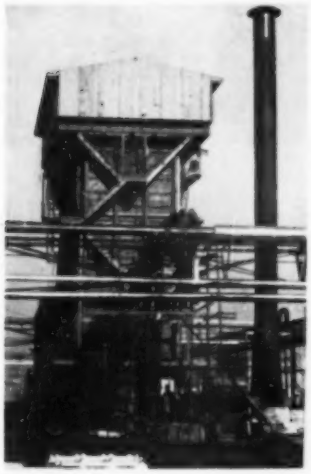
These mounds would still require trimming by shovel if not for an ingenious mechanical trimmer which is lowered down the hatch below each feed funnel. Operated electrically, with full spark insulation for use with combustible materials, the trimmer spreads the material out evenly by means of a system of rapidly whirling



RESEARCH IN THE JUNGLE

This laboratory is the Canal Zone Biological Area on Barro Colorado Island in Gatun Lake, part of the Panama Canal. Eastman Kodak maintains a field test station here for tropical research on photographic materials.

belts. The trimmers eliminate interruption of loading for manual trimming and build up an even bulk surface. At present the system is only used in wheat loading but it promises to be adopted in other bulk loading operations.



Petrochemicals' first Catarole furnace goes on stream near Manchester.

Catarole Process Plant Opens in Britain

London—First full-scale cracking furnace of Petrochemicals Ltd.'s plant for producing chemicals from petroleum has just started up, at Partington, near Manchester and is processing raw material at a rate in excess of its nominal capacity.

The furnace is the first of a battery of cracking furnaces that will be eventually in operation, to handle a total throughput of 75,000 to 100,000 tons per year of "charging stock." It is too early to say how many furnaces there will be.

The $18.5 million British-designed and British-built Petrochemicals plant employs the Catarole process—developed in Britain—which enables the production of over 70 different chemicals from the liquids and gases derived from petroleum. These chemicals are raw materials for paints and varnishes, rubber and plastic products, dyestuffs, detergents, drugs, pharmaceuticals, special fuels, and numerous other commodities.

Until now, many of these chemical raw materials have either had to be imported from dollar areas or had to be produced by less economical or less productive methods. A number

(Continued)

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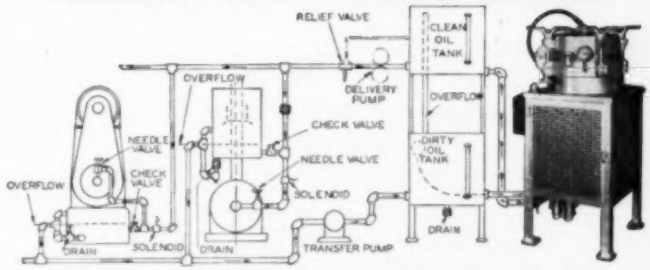
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General Electric Co.
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. . or manufacturers of optically coated lenses, metallized paper, cyclotrons . . . in short any manufacturer using high vacuum rotary pumps.

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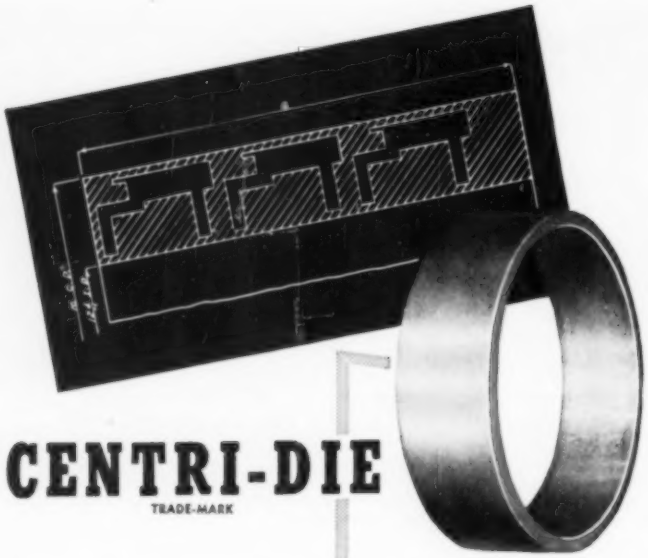
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CIRCLE L

of the chemicals have never been available in Britain, in bulk, before.

The cracking furnaces transform the charging stock into liquids and gases whic hare processed ins ubsequent plants to yield finished chemicals. The valuable gas yield is even higher than was at first anticipated. The gas is of high calorific value and part of the output is being piped direct to the Manchester Corporation Gas Works to blend with the town gas supply. It is estimated that this arrangement will save the Manchester Gas Department a capital expenditure of £250,000 and about 53,000 tons of coal per year, which would have been required to produce the additional quantity of gas needed to meet the gas shortage in the area.

More Delay on Australian Aluminum Plant

Melbourne—The third annual report by the Australian Aluminum Production Commission, released early in March, again fails to indicate when and where construction on Australia's first light-metal plant is to commence. The project has been pending for almost eight years.

One reason for the long delay was provided by the development of new processes in Europe which the commission decided to investigate before committing itself on design details.

The Dorr Co., New York, has been in charge of the preliminary design. As a result of discussions in Norway with the technical staff of Elektrokemisk A/S, holders of the world patent rights to the Soderberg electrode system, it was decided to modify the original Dorr design. On the other hand the commission is convinced that direct reduction processes, by which aluminum ores are treated directly in electric furnaces to produce alloys from which the metal is later extracted, have not been improved sufficiently to warrant abandonment of the projected Baver-Hall alumina plant. However, the commission is maintaining contact with organizations working on the Fondal and similar direct reduction processes.

The commission is prepared to abandon all original design plans in case suitable plant should become available from Germany or Japan. There is little hope of obtaining a suitable refinery along with other German reparations shipments. Commission engineers have been sent to Japan to determine whether Japanese types of plant are technically suited to Australian requirements. Apart from

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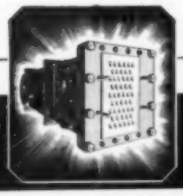
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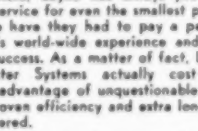
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reparations, the commission is interested in equipment offered in Norway and in the United States. The American equipment includes complete rectifier installations. Finally, the possibility of obtaining surplus plant in England is under investigation.

The commission is planning in terms of 10,000 tons of ingot a year.

More New Products Made in Great Britain As Chemical Industry Expands

London — The business recession noted in other British industries has not hit the chemical trades yet. Employment remains high, production is increasing as new plant comes into operation, and the number of chemical products is steadily growing. British exports in the chemical group have jumped from $30,000,000 in December to $33,650,000 in January—a good start toward the export target of $36,000,000 set for chemicals, dyes, drugs and paint makers this year. The Board of Trade recently reviewed these export targets, but saw no reason for changing that for chemicals.

India, Pakistan, Australia, South Africa, Egypt and Malaya—all old established markets for British chemicals —have recently increased their purchases. Expansion of shipments to these countries accounts for the bulk of the recent British export gains. But the authorities do not feel very happy about the growing preponderance of sterling markets for chemical exports. Trade talks have recently taken place with Canada, Argentina, Switzerland and the Netherlands, and it is hoped that these will result in larger shipments of chemicals to hard-currency markets.

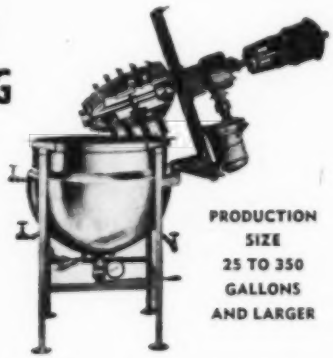
Latest newcomers to the range of British export chemicals, though as yet of no commercial importance, are radio-isotopes produced at the government's atomic energy research establishment at Harwell. The whole production so far came from the graphite low energy experimental pile which recently turned out 150 samples a month. Not quite a year ago this pile produced 120 specimens of 30 different elements a month, of which one-third was used at Harwell and the

(*Continued*)

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remainder went to British hospitals and research laboratories. The second and far larger pile has now come into production, and it is stated that when operating at full power later this year, it will be able to produce all the artificial radio active isotopes required in Britain by medical, industrial and other research workers, and more isotopes will also be available for export. Deliveries from the large pile, known as "Bepo," started early in March, 18 months after the first deliveries from the small "Gleep" pile. Materials irradiated in Bepo will be twenty times more active than those irradiated in Gleep.

Meanwhile a valuable addition to the hydrocarbon chemicals industry has come into operation in the form of the first cracking furnace of the Petrochemicals plant at Partington, Cheshire. Residual gas from this plant is already being piped to the Manchester city gas department, and aromatic solvents and plasticizers are being produced in addition to benzene, toluene and xylene. Availability of bulk supplies of isopropyl alcohol, isopropyl ether, ethylene oxide, ethylene glycol, naphthalene, hydrocarbon resins and para-tertiary butyl phenol is forecast for next fall, and polycyclic aromatics, propylene derivatives, acetone and ethylene dichloride are to be made in the Partington plant by the end of 1949.

The government's policy of encouraging petroleum refining and chemicals production in the British Isles also benefits the Manchester Oil Refinery which is closely connected with the Petrochemicals venture. The Manchester Oil Refinery plant at Trafford Park is now producing oil soluble petroleum sulphonates used to replace sulphurized vegetable and animal oils in the manufacture of cutting oils, insecticides, soluble textile oils, etc.; sulphonic acids for use as fat splitting agents for soap manufacture; water soluble petroleum sulphonates for use as surface-active agents; and extracts for use as rubber extenders, linseed oil substitutes, etc. The company is erecting additional plant to increase the flexibility of the refinery which specializes in lubricating, transformer and white oils.

Little has been heard of late of the National Coal Board's intentions in the field of coal distillation and by-product manufacture, but private companies at the fringe of the nationalized coal mining industry consider the prospects sufficiently favorable to engage in plant extensions. Midland Tar Distillers Ltd., one of the leading firms in its field, which put a new

(Continued)



1 First step in this installation of Kaylo Heat Insulating Block is the welding of long Nelson Insulation Pins to the surface. Section of a large dryer is shown here.



2 Block is then impaled on the pins and pushed against the metal surface. Two layers are being applied. Workman here applies first layer; "Speed Clips" over second layer anchor both layers in place.



3 Kaylo Heat Insulating Block is available in standard block sizes. Where special shapes are needed, the block can be easily cut to fit with ordinary hand or power tools.

KAYLO HEAT INSULATING BLOCK

Remarkable advantages combined in one material



4 Final step is cutting off projecting ends of insulation pins as shown. (A cement finish may be applied over the block and troweled smooth.)



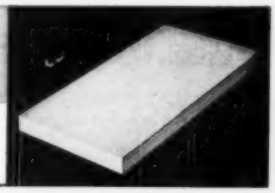
5 When completed, this dryer will have the best in heat insulation—Kaylo Heat Insulating Block . . . lightweight, strong, highly efficient and easy to install.

KAYLO Heat Insulating Block combines those outstanding advantages that almost every user of heat insulating block is seeking—light weight, strength, high efficiency and a wide temperature range—from ambient temperatures up to 1200° F.

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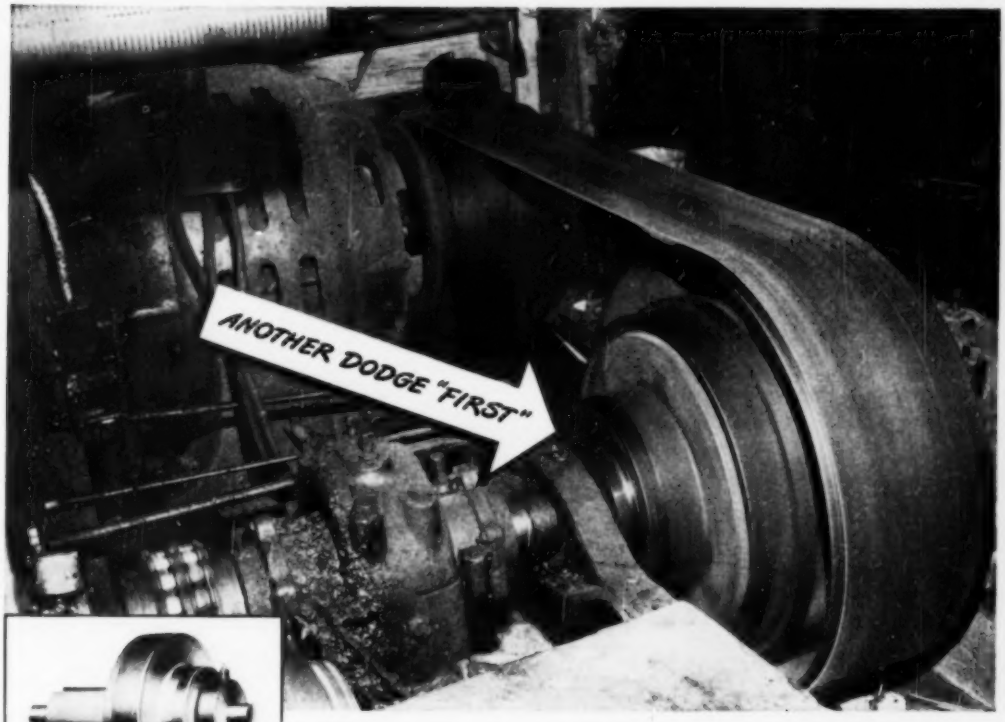
large-scale distillation unit into operation last October is going to erect an additional crude tar distillation plant and more refining plants to deal with intermediate products. The increased tar acid output has so far been placed easily, and creosote supplies of this and other coal-tar distillers are still taken over by Imperial Chemical Industries Ltd. for conversion into motor fuel, a free contract having replaced the government direction of wartime and the immediate postwar years.

Coal production has increased slowly but steadily in the early part of this year and is now running at an annual rate of 225,000,000 long tons. As the winter has been mild, certain stocks have been accumulated, and the Coal Board may feel that in view of the progressive improvement more coal could in future be released for chemical utilization. More coke is needed to meet the growing needs of iron makers, and more coke-oven by-products are therefore being obtained. Chemical interests are pressing for more attention to be paid to benzene recovery and other means of making maximum use of chemical possibilities with regard to coal distillation derivatives. As the latter are valuable dollar earners, the authorities are believed to meet these wishes with understanding.

A contract has been placed with Simon-Carves Ltd., Stockport, for the building and equipment of a 10,000 ton carbon black plant at Ellesmere Port, Cheshire. The plant in question will be operated by Cabot Carbon Ltd. in which the Massachusetts firm of Godfrey L. Cabon Inc. is interested. The scheme is of special importance as it is the first one to be inaugurated under ERP auspices. Goodyear Tyre and Rubber Co. (Great Britain) Ltd., another subsidiary of a U. S. firm, has opened a factory for the manufacture of Pliofilm transparent rubber hydrochloride packaging material at Wolverhampton. Armour & Co., Chicago, has authorized Hess Products Ltd., a British firm of fatty acid distillers, to erect a fat and oil fractionation plant on the model of their own plant at Chicago.

Photographic film base will soon be made in large quantities in Britain. Bexford Ltd., a subsidiary of Ilford Ltd., the photographic specialists, hopes to bring the first of several new units into production this year. Though the cost of this extension will be some 25 percent higher than calculated, the company expects a large saving in foreign exchange. The president of the Board of Trade recently announced in the House of Commons that a new photographic film base

(*Continued*)



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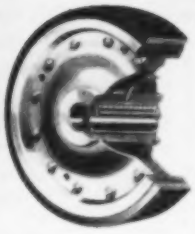
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CASTERS

FOREIGN NEWS, *cont. . .*

factory was expected to come into operation in the next few months. Another similar project was abandoned last year by the firm concerned after consultation with the authorities, but British requirements are nevertheless likely to be met soon largely by local production.

Report From Prague Shows Rapid Growth In Chemical Process Industries

Prague—The Czechoslovak chemical industry reached 99 percent of the targets it had set for itself in the two years ended December 1948. The following branches surpassed the targets: synthetic fuel, industrial greases, sulphuric acid, phosphate fertilizers, nitrogenous fertilizers, artificial silk, pigments and paints, varnishes, titanium white, soap, benzoic acid and important pharmaceutical products.

The production of synthetic fibers is contributing largely to improving the textile supply situation.

The Two-Year Plan for the chemical industry was mainly a plan of reconstruction. This has not been entirely carried out because of insufficient supply of capital investment goods. During the two years the volume of wages and salaries rose by about 40 percent and per capita output by 65 percent. It is planned to increase the 1948 output of $400,000,000 to about $700,000,000 by 1953. It is planned to have 87,000 workers in the industry by that year.

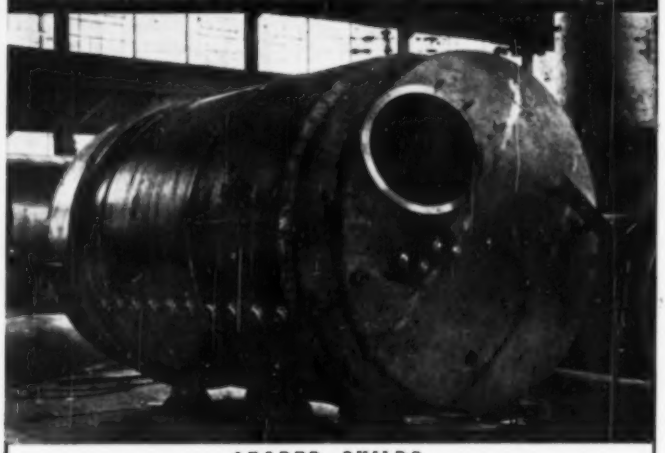
The Five-Year Plan just beginning envisages development first of all in fertilizers, pharmaceutical, acetylene derivatives, heavy organic chemicals, plastics and organic dyes.

The Czechoslovak Paper Mills at Vrane are manufacturing cigarette paper containing non-flammable glass fibers. Patent has been applied for. Chief advantage is that, while smoking, the non-flammable fiber forms a net which holds the ash and prevents it from falling. The Czechoslovak Tobacco Monopoly has started manufacturing the first series of cigarettes with this new paper.

The Granitol company at Moravsky Beroun, is the largest works of its kind in Central Europe; it pro-

(*Continued*)

STAINLESS STEEL PROCESS KETTLE

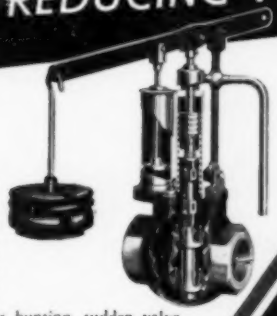


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For complete details, write Dept. BP-4 for Bulletin No. 146.

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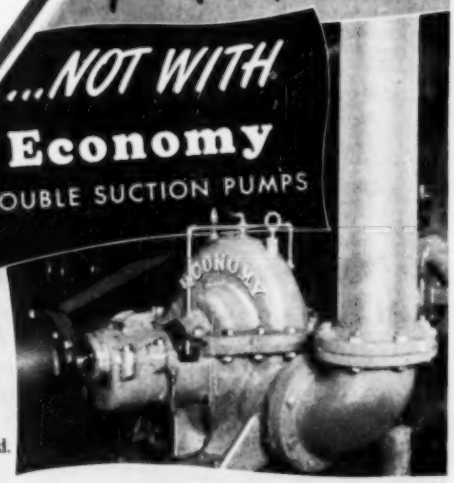
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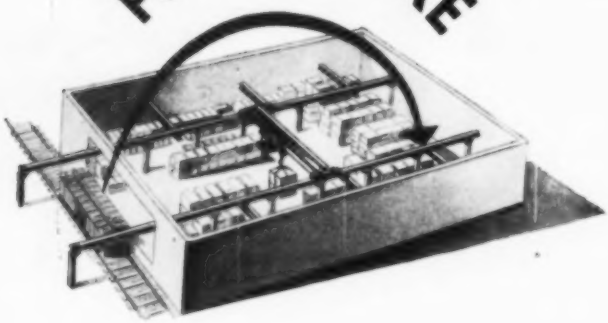


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duces artificial leather, rubberized textiles and linoleum. The main output is Granitol artificial leather, produced on a textile basis with coatings of nitrocellulose. Granitol does not break, is pliable, unaffected by extreme heat or cold, waterproof, and is supplied in a large range of colors. It is used extensively in Czechoslovakia in the auto and aircraft industry, for sanitary ware, handbags and fancy leatherware, footwear, upholstering on furniture, and binding books.

The Research Institute of the Bata National Corp. (recently re-named SVTT) has produced a new material based on a combination of plastics and textiles. This material is excellent for heeling gym shoes and other footwear for which chrome leathers have hitherto been used. These heels are waterproof and do not slip. The Institute has also been studying ways of utilizing leather waste. One method is to grind leather waste into a powder which is mixed with a suitable binding agent into a paste from which soles and heels are molded. These pressed leather products are claimed to be equal to the original leather in quality and are much cheaper.

One good result of the 1947-48 drought was the production of a new glue by the Dornvcha Chemical Works at Brno. This factory had been producing a glue from wheat and rye starch for the use of a local factory producing bobbins for the textile industry. The Chemical Works Ing. G. Schneider produced a new glue by replacing the wheat and rye starch with potato starch; after some trials, this new glue is being extensively produced.

The Polish stone, earthenware and ceramic industry is expanding rapidly—40 percent more goods were produced in 1948 than 1947, value about $9,500,000. In 1949 it is planned to produce goods to the value of $16,000,000, of which $5-7,000,000 is earmarked for export. Glass and porcelain are the chief items sold, biggest customers are USSR, United States, Bulgaria, and Holland. Half a dozen Czech specialists are now working in the ceramic factory in Ziebicy, Upper Silesia, while a similar number of Polish experts will soon come to Czechoslovakia to exchange technical experience between the two country's industries.

Polish salt deposits are among the richest in the world. The most modern mines in Poland are at Wapna, their output is 180,000 tons of high quality edible salt annually. The salt works at Inowroclav produce 40,000 tons annually from salt mineral waters.

(*Continued*)



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This is mainly used for canned fish and preserving butter. The Scandinavian countries are steady customers for this grade of salt. The Velicka mine produced about 180,000 tons annually, mainly for industrial and agricultural purposes. The Polish Salt Monopoly controls all production and sales of salt. The annual production of over 400,000 tons is more than necessary for the home market, and is exported. Prewar exports averaged about 15,000 tons annually, two years ago Poland exported 33,000 tons, more than half of this to Czechoslovakia. In 1948 Czechoslovakia purchased 29,000 tons. Other chief buyers are Sweden, Finland and Denmark.

The first factory for the production of dry ice has begun output in Gdansk.

Poland is supplying the Czechoslovak chemical industry with phenol produced from brown coal in the normal manner. But two Polish engineers are working on a new method of obtaining phenol from peat. They claim peat is a much better raw material for this purpose.

Poland is extending the cultivation of the synthetic rubber plant koksaghyz, grown on a vast scale in the USSR. Cultivation of this plant was begun in Poland during the war years.

Polish Engineer Rojek is applying for a patent for his new type of luminous paint, which shines very clearly in the dark. After three minutes either in daylight or electric light, the paint will shine clearly in the dark for 15 hr. Any type of material can be coated with this new paint, the advantage of which is the indestructibility of its illuminating energy.

Briefs . . .

Amsterdam—Netherlands Yeast and Spirits Factory of Delft, which already supplies the entire Dutch demand for penicillin, had begun construction of a new large penicillin factory, which will produce also for export.

Ottawa—Letters patent have been granted here by the Secretary of State Department, Canadian Government, for the incorporation of Western Solvents & Chemicals (Canada) Ltd., with the head office to be in Windsor, Ont., as a private company.

Amsterdam—The United States will purchase 10,000 tons ($3,970,000 worth) of Indonesian palm oil for strategic stockpiling. The funds will be derived from the Indonesian and Dutch counterpart money.

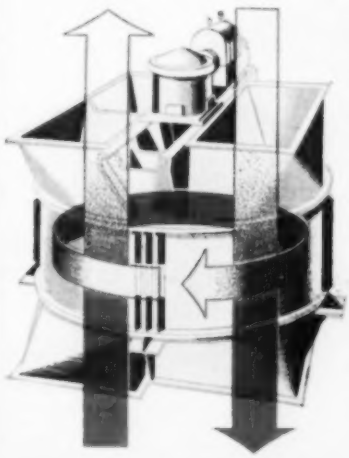
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The Corrosion Forum

EDMOND C. FETTER, *Assistant Editor*

Fatty Acids versus Construction Materials

Part I of a symposium in which a representative group of construction materials are evaluated for services involving fatty acids.

Glass-Lined Steel

S. W. McCANN, The Pfaudler Co., Rochester, N. Y.

Glass-lined steel chemical equipment is entirely resistant to all of the fatty acids at temperatures normally encountered. The greatest application of glass-lined steel for handling fatty acids has been in the cosmetics industry where steam jacketed open kettles with or without agitation have been used for melting solid fatty acids prior to further treatment. This further treatment may involve emulsification, saponification or treatment with mineral acids. The products processed in glass-lined steel equipment are high grade face creams, shaving creams, and similar quality items. Temperatures usually encountered are less than 300 deg. F. In these cases glass lined equipment is used to insure absolute purity of product and prevent the possibility of metallic contamination.

Large tanks for the storage of oleic acid have been used for a number of years with success. In this application again it is necessary to avoid metallic contamination during the period of storage. Individual storage units are custom built to dimensional requirements but are available up to a maximum of 30,000 gal.

Carbon and Graphite

W. W. PALMQUIST, National Carbon Co., Cleveland, Ohio

Laboratory tests and field installations over a period of years indicate that commercial forms of carbon (including graphite and Karbate impervious carbon and graphite) offer complete resistance to attack by fatty acids. These materials are especially useful when additives or diluents increase the corrosive properties of the pure compound. All of the materials are practically immune to thermal shock and afford freedom from metallic contamination; in general, the use of one particular form is determined by consideration of such properties as weight, strength, machinability, thermal conductivity, imperviousness and cost.

Structural carbon and graphite offer a lightweight, adaptable medium for such fatty acid applications as troughs, ducts and linings of tanks, towers, digesters and reaction vessels where slight porosity is permissible. Standard forms such as brick, slabs, tubes and plate stock are available in either material. In reducing atmospheres structural carbon and graphite are unattacked at any commercial temperature, while the working range in oxidizing atmospheres is limited only by the threshold oxidation temperatures of 350 deg. C. and 400 deg. C. for carbon and graphite, respectively.

Karbate impervious carbon and graphite are suitable for fatty acid applications wherein the material body temperatures do not exceed 170 deg. C. Since impervious graphite offers high thermal conductivity and good machinability, it is especially useful in heat exchangers handling fatty acids alone or containing other corrosive agents. Types of heat exchangers available include bayonet, plate, cascade, concentric tube and conventional shell and tube construction. Immersion type heat exchangers find widest use in the heating or cooling of liquids contained in reaction vessels or storage tanks.

As examples of large units employing Karbate tube construction, evaporators are used for the concentration of lactic acid to 50 percent strength under vacuum on the tube side and steam at 6 psig. within the steel shell. The tubes of one unit in service for four years show no evidence of chemical attack. Condensation of lactic acid is carried out in Karbate tube condensers with water at 45 psig. on the shell side. After several years operation in a similar process, Karbate impervious graphite tubes installed in a levulinic acid evaporator are unattacked; liquid transfer is accomplished with a Karbate centrifugal pump operating at 1,800 rpm.

Stainless Steel

GRANT L. SNAIR, Allegheny Ludlum Steel Corp., Brackenridge, Pa.

The collective term "fatty acids" covers a number of organic compounds ranging from the low molecular weight liquids such as formic acid and acetic acid to the very heavy long chain solids such as stearic acid. Although they are classed chemically as weak acids, they can, at high temperatures, attack many of the common metals frequently used as materials of construction.

Considering the large amounts of fatty acids which are involved in the production of high quality chemicals, soaps, foods, pharmaceuticals, and in the processing of textiles and leathers, protection from contamination by corrosion products is essential.

In general, stainless steel offers excellent resistance to corrosion by any of the fatty acids under practically all operating and service conditions in the rather broad fields in which they are employed. Stainless steel materials have been found suitable for storage tanks, shipping containers, reactors, autoclaves, extractors, heat exchangers, heating coils, pipe lines, valves, pumps, centrifugals, and all other processing and handling equipment.

Having discussed acetic acid previously in a separate symposium, only brief mention as a member of the fatty acid series is necessary here. Stainless steel Types 304 and 308 are usually chosen for handling the liquid or its solutions and also for contact with 100 percent acetic acid vapors, while Types 316 and 317, which offer a greater measure of protection against corrosion by pitting, are best suited for exposure to dilute vapors or for operation at high temperatures and pres-

Continued

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sures above normal atmospheric pressure.

Stainless steel Type 316 safely resists attack by formic acid (the strongest acid in the series) and its solutions and vapors in all concentrations at a temperature of 300 deg. F. For welded equipment, Type 316 containing 0.06 percent max. carbon or Type 317 containing greater amounts of chromium and molybdenum would be preferred in order to control carbide precipitation in welded regions.

The remaining commercially important members of the fatty acid series are present in the various animal and vegetable oils, fats, and waxes, or they are formed from esters in these natural substances by means of hydrolysis. As a general rule, several different fatty acids occur in varying amounts in each oil, fat, or wax.

When the processing involves high temperatures and pressures as in the manufacture of soaps, glycerin, certain foodstuffs, chemicals, pharmaceuticals, and materials for use in paints or as in the recovery of fatty acids from waste pulp liquors, the effect of the fatty acids included in the raw materials or formed from them also must be considered. With few exceptions, the information related to certain distinct types of processing are applicable to any of the fatty acids found in vegetable and animal oils, fats, and waxes.

Stainless steel has been widely used for handling either liquid, semi-liquid, or solid fatty acids where the quality of the product must be protected from contamination by corroded equipment throughout all stages of processing. Types 304, 347, and 316 are most suitable, the distinction between the types being that Types 304 and 347 are safely used for service at temperatures as high as 200 deg. F., while Type 316 is required where more severe corrosive conditions must be withstood at higher temperatures and pressures. Their adoption has proved advantageous in the processing of oils and fats for oleomargarines and shortenings. Reactors lined with stainless steel Type 304 are employed for the hydrogenation of oils which are used for making soap and edible fats, and oil and wax emulsions are prepared in Type 304 homogenizers.

Various oils and oil products for use in the textile industry as lubricants, solvents, and scouring, wetting and emulsifying agents are processed in stainless steel equipment. Type 316 sulphonating tanks, heating coils and pipes are suitable in most cases for the treatment of vegetable and animal oils. Of course, the sulphuric acid concentration and the temperature are the chief factors determining whether stainless steel can be used for sulphonating equipment.

Summarizing briefly, stainless steel can be expected to perform satisfactorily in most fatty acid applications where corrosive conditions are extreme as long as the original quality of the metal is maintained during fabrication by proper welding and if welding flux is carefully removed from the surface of the metal prior to use.

Note: The following article was received too late to take its rightful place in the hydrochloric acid symposium, final portion of which appeared in this column last month.—Editor.

Hastelloy Alloys

C. G. CHISHOLM, Haynes Stellite Co., Kokomo, Ind.

For many years, the Hastelloy alloys have been one of the few materials commercially available for handling hydrochloric acid satisfactorily. Hastelloy-A has been successfully employed for handling all concentrations of the acid up to temperatures of approximately 160 deg. F. Hastelloy-C has possessed useful resistance to all concentrations of hydrochloric acid at room temperature and up to 125 deg. F. Hastelloy-B has been most outstanding for its unusually high resistance to hydrochloric acid solutions of all concentrations, and at temperatures up to the boiling point.

It should not be concluded, however, that Hastelloy-B or any of the others is necessarily a cure-all for hydrochloric acid problems. Under some conditions, it is most difficult to run laboratory tests to determine the suitability of alloys for hydrochloric acid service where the concentration of the acid is greater than the azeotrope, which contains 20.2 percent hydrochloric acid. This is due to the difficulties that are encountered in completely refluxing the HCl gas liberated from boiling solutions of concentrations over 20.2 percent.

This has led to some questionable results in previous experimental data, since the normal testing procedure employed under a reflux condenser has not been adequate for maintaining the starting concentration throughout the period of the test. Also, the effects of oxygen and temperature have considerable bearing on the ultimate corrosion rate under actual operating conditions. In order to obtain a better picture of the possible corrosion rates, under both aerated and unaerated conditions in a closed system, tests were recently run by Union Carbide and

(Continued)

SEVEN REASONS WHY DURCOPUMPS ARE SO WIDELY USED FOR HANDLING CORROSIVES

1 A complete range of corrosion resisting alloys for all corrosive conditions: Duriron, Durichlor, Durimet 20, Durco D-10, Chlorimet 2, Chlorimet 3, Monel, Pure Nickel, Inconel, Ni-Resist, Nickel Cast Iron, Cast Steel.

2 The wet end parts can be changed from one alloy to another to meet changing corrosive conditions, without purchasing an entirely new pump.

3 Seal cage for providing lubricant or liquid seal is made of synthetic resin (Teflon) which cannot score the shaft.

4 Impeller may be positioned in casing for best operating condition by a simple micro-adjustment.

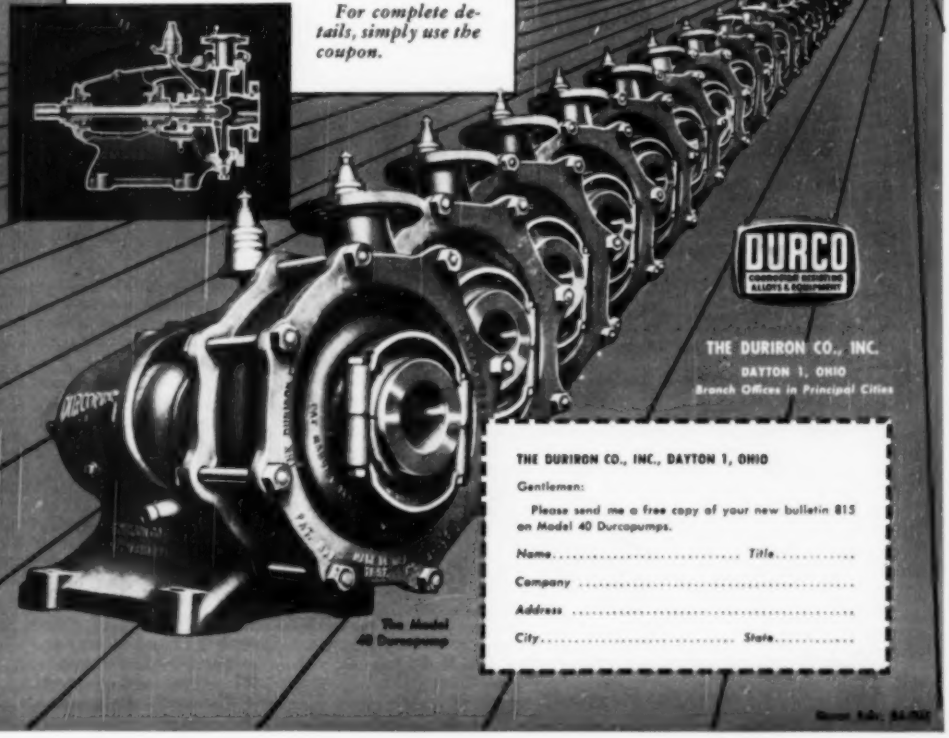
5 Threads on shaft are not exposed to the corrosive.

6 Pressure in stuffing box is relieved by vent ports in impeller.

7 Renewable shaft sleeves lessen maintenance costs.

Model 40 Durcopumps are available in capacities up to 2000 G.P.M. and for heads as high as 230 feet.

For complete details, simply use the coupon.



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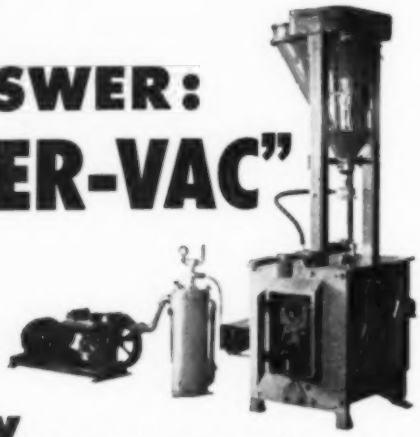
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WHY... Dust and spillage are a thing of the past! It's the skillful combination of auger and vacuum that does the job . . . does it well. The Auger-Vac turns out from 10 to 20 units a minute—each container filled *tight* to the exact amount required. Powdered milk, cocoa—in fact, any powder filling job is an economical and efficient operation—because of Auger-Vac, another fine product of Stokes and Smith.

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Carbon Research Laboratories, Inc., at Niagara Falls, N. Y. Hastelloy alloys B and C were tested in solutions containing 10, 25, and 37 percent hydrochloric acid at temperatures of 70, 100, and 135 deg. C. and also under pressure to prevent change in the acid concentration.

Tests were conducted in 25 mm. O.D. heavy-walled Pyrex tubes, which were heated to the desired temperature in an autoclave under a pressure of 2,000 psi.; 50 ml. of solution was used for each sample with a surface area of approximately 2.5 sq. in. The specimens of Hastelloy alloys B and C were in the form of polished rods, 1 in. in diameter, which had been prepared from wrought materials by the Haynes Stellite Co. The duration of the tests was approximately 40 hr.

One set of tests was made in sealed glass tubes with an atmosphere of nitrogen under 2,000 psi. in the autoclave to prevent the tubes from breaking from the internal pressure. Under these conditions, there was practically no air present in the solution.

Corrosion Rates (Mills Per Yr.) of Hastelloys B and C in Hydrochloric Acid

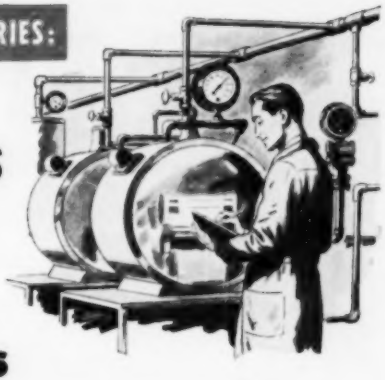
Acid Conc., & Temp.	Hastelloy B	Hastelloy C
(UNAERATED: Tests made in sealed glass tubes)		
10%, 70°C.	...	22.8
100	0.76	...
135	2.05	...
25%, 70°C.	0.23	2.95
100	0.77	61.2
135	4.9	...
37%, 70°C.	0.24	6.4
100	1.2	110.
135	8.8	...
(AERATED: Tests made under atmosphere of air at 2,000 psi.)		
10%, 70°C.	3.5	11.4
100	26.2	29.3
135	40.2	101.
25%, 70°C.	5.7	9.1
100	15.2	44.9
135	34.6	240.
37%, 70°C.	0.71	18.5
100	8.2	127.
135	29.5	389.

Since the presence of oxygen greatly influences the corrosion rate of Hastelloy-B, another set of tests was made in open glass tubes in the autoclave under an atmosphere of air (cylinder gases used to make 80 percent nitrogen and 20 percent oxygen) at 2,000 psi. It was estimated that the greatest pressure that would be developed in any of the solutions was about 600 psi. from the 37 percent hydrochlroic acid at 135 deg. C. Thus, an atmosphere of air at 2,000 psi. would likely prevent excessive loss of hydrochloric acid even for the concentrated acid. Analyses of two of the solutions at the conclusion of the test in open tubes at 135 deg. C. showed them to contain 25 and 34 percent HCl in the solutions originally containing 25 and 37 percent acid, respectively.

The results of the tests are given in the table above. —*End*

IN THE CHEMICAL PROCESS INDUSTRIES:

6 out of 10 Men Who Buy Gauges Specify US Gauge



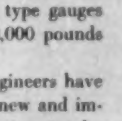
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CHEMICAL GAUGES
(Cleanout Type)

For use with any media whose viscosity may require provision for periodic cleaning of gauge. Upper housing is of alloy steel with a specially designed seat to receive the corrosion-resistant diaphragm on a tapered fit, metal to metal seal. Diaphragms are available in stainless steel, aluminum, tantalum, Neoprene and in silver and other precious metals. Mounting flange supplied as standard in forged steel. Ranges: 30" vacuum to 400 lbs. p.s.i.



CHEMICAL GAUGES
(Cleanout and Protected Types)

Furnished as cleanout type gauge for use where media are viscous and tend to clog, or furnished as protected type gauge for use with media of low viscosity. Upper housing (which does not contact corrosive media) is cast iron. Lower housing is stainless steel but is available as extra in special metals. The heavy corrugated diaphragm is of solid stainless steel, or may be had as an extra in special materials or precious metals and is secured between the two housings with a metal to metal seal without use of sealing gaskets. Ranges: 160 to 1500 p.s.i.



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Pressure actuated, high-capacity, snap-action switches with accurate repeatability and low switching differentials. For use on hydraulic pumps, presses, etc., or for use as a signaling or control mechanism for low and high tank levels or pressures. Type V contains 2 independent single pole, double throw switches actuated from a single bourdon tube. Type VI is identical to type V but is equipped with a second independent bourdon tube so that the indicated pressure is independent of the element actuating the contacts. Ranges: 0 to 30" vacuum, 15 to 20,000 lbs. p.s.i.

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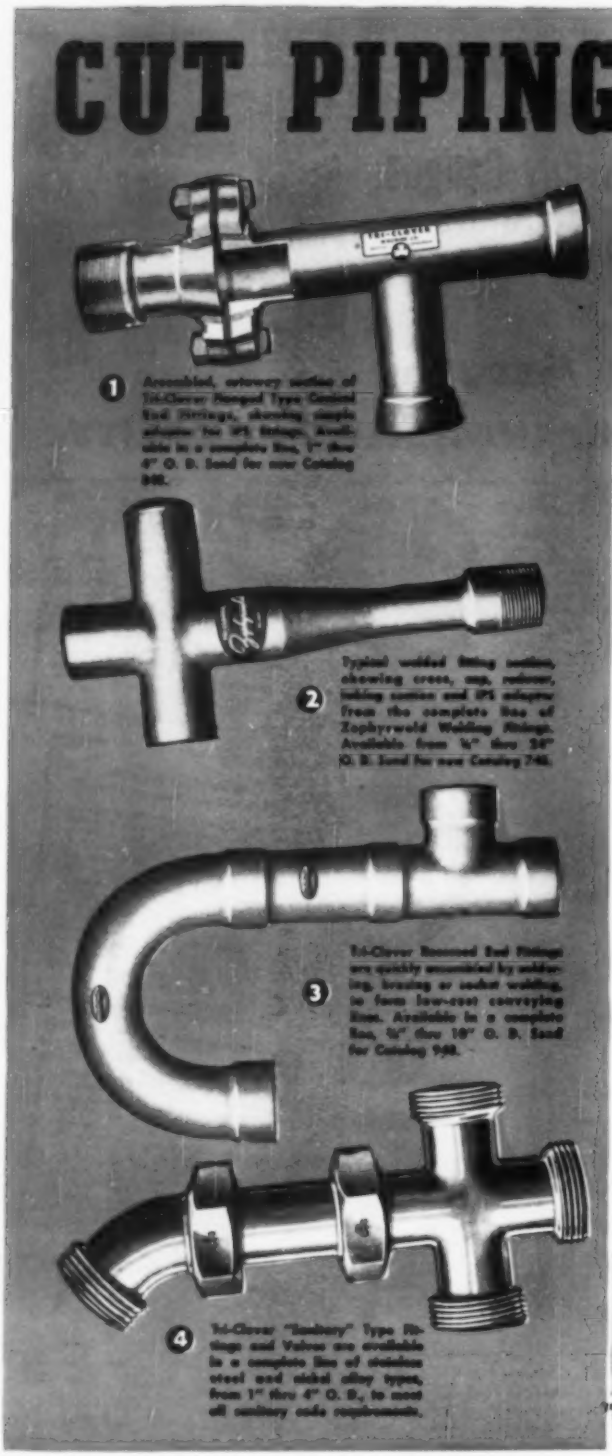
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1 Assembled, cutaway section of Tri-Clover Flanged Type Coupled End Fittings, showing simple scheme for IPS fittings. Available in a complete line, 1" thru 4" O. D. Send for new Catalog 848.

2 Typical welded fitting section, showing cross, cap, reducer, tubing section and IPS adapter from the complete line of Zephyrweld Welding Fittings. Available from ¼" thru 24" O. D. Send for new Catalog 748.

3 Tri-Clover Recessed End Fittings are quickly assembled by soldering, brazing or socket welding, to form low-cost conveying lines. Available in a complete line, ½" thru 10" O. D. Send for Catalog 948.

4 Tri-Clover "Sanitary" Type Fittings and Valves are available in a complete line of stainless steel and nickel alloy types, from 1" thru 4" O. D., to meet all sanitary code requirements.

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featuring . . .

- LOW FIRST COST
- LOW UPKEEP
- STREAMLINE CONSTRUCTION
- FULL CORROSION RESISTANCE
- EASY TO INSTALL
- POCKETLESS
- LEAK-TIGHT
- READILY ADAPTABLE TO OTHER FITTINGS

See your Tri-Clover Jobber for details, or write for catalogs covering any of these four basic fitting types.

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TRIALLOY AND STAINLESS STEEL SANITARY FITTINGS, VALVES, PUMPS, TUBING, SPECIALTIES

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THE Complete LINE

FABRICATED STAINLESS STEEL INDUSTRIAL FITTINGS AND INDUSTRIAL PUMPS

Names in the News



MAN OF THE MONTH

Charles D. Goodale

Commercial Chemical Development Association, at their annual meeting in New York, picked as their president Commercial Solvents' modest and popular Charlie Goodale.

Charles D. Goodale (Purdue '23) joined Commercial Solvents Corp. in 1926 after a couple of years of graduate work in soil bacteriology and chemistry. He's been with CSC in Terre Haute ever since. He started in the chemical laboratory in charge of bacteriological control. Then came a year of research, from which he went into sales development work under Henry W. Denny who is now vice president in charge of sales.

In 1942 CSC made a new technical service division by combining sales development and trade relations. Goodale was later picked as manager of the division and in recent years has concentrated his attention on market development and technical service.

He was born Jan. 18, 1900; is married; has four children, the oldest a sophomore in Wesleyan and the youngest 13; has no other hobbies, he claims.

In addition to his membership in CCDA, he belongs to ACS and the New York and Chicago Chemists' Clubs.

Albert J. Rothman has recently been employed as a project engineer by Colgate-Palmolive-Peet Co. in Berkeley, Calif. He was formerly in the chemical engineering division of the Stamford, Conn., research laboratories of American Cyanamid Co.

Tilford H. Bean has been appointed manager of manufacturing for Stanton Chemicals, Inc., and will be in charge of operations at the company's new plant at Corpus Christi, Tex., designed to manufacture aromatics from petroleum hydrocarbons.



T. H. Bean



F. D. Snell

Foster Dee Snell has been named by the council of the Society of Chemical Industry, London, to receive the Society's Gold Medal for 1949. The Medal has been awarded biennially since 1896 and has been awarded to only one American, Prof. Ira Remsen of Johns Hopkins University in 1904. Presentation will be made in England, July 13.

Donald W. Darnell has been made president of Fluor Corp., Ltd., Los Angeles. He joined Fluor in 1925 and has been vice president and general manager since 1947. **J. S. Fluor, Jr.,** has returned in the position of executive vice president. **W. Earl Dunn** is now vice president and general manager of the engineering and construction division; **J. Robert Fluor** has a parallel position in the manufacturing division.

James H. Curtis has been named manager of refineries for General Petroleum Corp., Los Angeles. He was formerly manager of the company's refinery at Torrance, Calif. **A. H. Thompson** succeeds Curtis as manager of the Torrance refinery.

L. A. Mekler has set up a consulting office in San Francisco. He was with Universal Oil Products Co.

Hiram Norcross, vice president of Shell Development Co., has been transferred to the London office of the Shell companies on special assignment.

William Long Belvin has been appointed head of the applied chemistry division of the Southern Research Institute, Birmingham, Ala.

J. W. Pegg has been appointed manager of the New York office of Shell Development Co.

George W. Ward, chairman of the inorganic chemistry division of Midwest Research Institute, has been appointed director of research of the Gustin-Bacon Manufacturing Co., effective June 1.

Thomas H. Daugherty has been named assistant director of research for Calgon, Inc., Pittsburgh, and **C. E. Kaufman** has been appointed assistant director of chemical research, Hall Laboratories, Inc.



T. H. Daugherty



P. F. Preston

Paul F. Preston has been appointed chemicals division manufacturing manager for the General Electric Co.'s chemical department, Pittsfield, Mass. Mr. Preston will supervise production processes at G-E silicone, alkyd resin, and plastics materials plants at Waterford, N. Y., Schenectady, N. Y., Anaheim, Calif., and Pittsfield.

John R. Pellam has been appointed to the staff of the National Bureau of Standards where he will be concerned with research in the cryogenics laboratory. **Ralph L. Nuttall** has also been appointed to the staff of the bureau where he is doing research on the thermal conductivity of gases at elevated temperatures and pressures.

E. P. Chaput, technical assistant to the vice president in charge of sales, has left Sharples Chemicals Inc. to become assistant to the executive vice president of Sharples Oil Corp.,

Continued

LOOK WHAT'S HAPPENING
on the Texas Coast

NEW RUBBER TILE PLANT FOR HOUSTON

The Wright Manufacturing Company of Milwaukee is moving equipment into its new $2,000,000 plant with plans to make Houston the home of "the aristocrat of flooring." Wright rubber tile is only one of the products that will be made from Texas raw materials. Others are conventional and custom-designed molded plastics for home and industry.

☆ ☆ ☆

PROGRESS REPORT ON CARTHAGE HYDROCOL

Construction is proceeding rapidly on Carthage Hydrocol, Inc's. new Brownsville plant. Reports are they will be charging 90,000,000 cubic feet of natural gas a day and that the new plant's daily production will be 6,000 barrels of synthetic gasoline, 1,100 barrels of other petroleum products and 300,000 pounds of assorted chemicals. Completion is expected in the latter part of the year.

☆ ☆ ☆

TALL TALE . . . BUT TRUE

A Britisher who was indulging in boasting aroused the ire of a grizzled rancher.

"King Edward touched my grandfather on the shoulder with a sword and made a lord out of him," the Britisher said.

"That's nothing," the ranchman snorted. "Old Sitting Bull touched my grandpa on the head with a tomahawk and made an angel out of him."

☆ ☆ ☆

FOLLOW THE LEADERS

Headed by such names as Alcoa and du Pont, leaders in the chemical industry have moved Southwestward at a rapidly increasing rate in the past few years. Chemical investment along the Houston Ship Channel alone currently totals $227,000,000. Attractions are unlimited quantities of acids, bases, fresh water and NATURAL GAS for hydrocarbons; reasons why your industry can profitably FOLLOW THE TREND TO TEXAS.

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To help you find out more about the area we serve, we will gladly: a, make a survey engineered to your company's needs; b, supply you with any special information you require; c, show you the coast country from Sabine to Rio Grande rivers — all in strictest confidence. Write, wire or telephone.

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NAMES IN THE NEWS, cont. . .

Denver, Colo. **L. E. Parks** has been transferred from Los Angeles to replace Dr. Chaput. **T. C. Dabovich,** formerly of the Chicago office, is now technical representative for the west coast and is located there with headquarters in Los Angeles.

Alfred Watson, assistant manager of the Buffalo district office of Hagan Corp. for the past two years, has been appointed manager. He succeeds **Charles A. Randorf,** who is continuing his service of Hagan and other companies in Buffalo as a manufacturers' agent.

H. Neville Potter has been elected executive vice president and general manager, Dearborn Chemical Co., Ltd., Toronto.

John L. Gillis, director of Monsanto Chemical Co.'s foreign department in St. Louis, has been appointed acting general manager of the company's Merrimac division with headquarters in Boston. Mr. Gillis will assume the duties of **Josiah B. Rutter,** vice president and general manager of that division who has been hospitalized for an indefinite period. Mr. Gillis will be succeeded as director of the company's foreign department by assistant director, **Marshall E. Young.**

M. G. Sturrock, Canadian expert in coal tar research, has been named manager of development for the tar products division of Koppers Co., Inc., Pittsburgh.

Arthur B. Austin, formerly assistant manager of the Hercules Powder Co. explosives office in Chicago, Ill., has been named manager of the Joplin, Mo., explosives office. He replaces **M. W. Latimer,** who died February 23.

Glenn D. Taflan has been named head of the control laboratory in the Centaur-Caldwell division of Sterling Drug Inc., plant at Monticello, Ill.

Robert M. Morris, formerly assistant plant manager of Monsanto Chemical Co.'s plant is now manager of the phenolics plant in Springfield, Mass.

Edward S. Monohan, and **Aaron F. Levy** have been made vice presidents of Schenley Distillers, Inc.

H. L. Edwards, associate professor of chemistry in the Georgia Institute of Technology, has been elected chairman of the Georgia section of the American Chemical Society. He succeeds **Charles T. Lester** of Emory University.

Charles L. Smith has been appointed to the staff of the product development department of Ethyl Corp., in New York, to assist in the development and application of various chemical products.

Charles H. Sommer has been appointed to the new position of assistant to Francis J. Curtis, vice president of Monsanto Chemical Co.

W. H. Barnes has joined the Clark Bros. Co.'s technical service staff in their Tulsa, Okla., office.



W. H. Barnes



A. E. Polson

A. E. Polson has been appointed a technical representative of the chemical division of the Goodyear Tire & Rubber Co., Akron.

David S. Weddell has been appointed director of development for Monsanto Chemical Co.'s western division, Seattle.

C. W. MacNeill has joined the Standard-Thomson Corp., Dayton, and will direct a new chemical and metallurgical laboratory now being established.

Harold E. Huber has been named head process engineer of Girdler Corp.'s Votator division.

Fred Jonker, a Dutch engineer specializing in problems of jet engines, has joined the University of Delaware's department of chemical engineering as an assistant research professor.

Norman Bouder, formerly with Armstrong Cork Co. has joined the research and development laboratories' staff of the Pemco Corp. and has been assigned to do research in glass colors; other recent additions include **Howard F. Smalley, Robert Carpender** and **Melvin J. Faby.**

Bernard E. Simonson, a recent chemical engineering graduate from the University of Illinois, has joined the

air force munitions branch, munitions division, Army Chemical Center, Md.

Edward Lavin, chemist on the research staff of the Shawinigan Resins Corp., has been granted a year's academic leave of absence for advanced study.

Harrison C. Givens, Jr., has been named plant manager of the Cumberland, Md., plant of Celanese Corp. of America. He succeeds **Fred T. Small,** a vice president and director, who is assuming new executive duties in the New York office.

Donald B. Keyes, vice president in charge of planning and development of the Heyden Chemical Corp., New York, has been awarded the first Honor Scroll of the New York Chapter of the American Institute of Chemists. The Scroll will be presented at a dinner meeting of the chapter to be held May 18.

Catesby Jones has joined the organic chemistry division of the Institute of Textile Technology, Charlottesville, Va.

William F. Herrmann, Jr., and **Robert D. Woosley** have joined the air force munitions branch, munitions division, technical command, Army Chemical Center, Md., as chemical engineers.

Eric Hammarstrom has joined the staff of the Komline-Sanderson Engineering Corp., Ridgewood, N. J. He will be engaged in process development work.

Nils M. Smith-Petersen has joined the public relations staff of Walter Weir, Inc., New York.

Victor Dorkovich has joined the New York consulting engineering firm of R. S. Aries and Associates as a senior associate. He will be working on coal-tar chemicals, wood preservatives, plastics and resins, from both the technical and economic point of view.

C. N. Richardson, previously associated with the Mathieson Chemical Corp., has opened a consulting office at Youngstown, N. Y., to specialize in mercury-cathode electrolytic cells, electric furnaces, and high-tension electric discharges.

Willard D. Peterson has announced association with Arthur D. Little, Inc., Cambridge, Mass. Dr. Peter-

(Continued)

How workers look at safety goggles . . .

"Are they comfortable?"



The answer to that question in your plant will determine to a large extent how effective your safety program is.

MonoGoggle Style No. 1

To most workers, comfort—or the lack of it determines whether or not they wear goggles or carry them around in their pockets. Whether they need safety spectacles, heavy duty goggles or plastic eye protection for minor hazards—look to the WILLSON line for comfort that gets safety equipment worn. The lightest weight commensurate with safety in a given operation; a choice of sizes; adjustability for exact fit; anatomically shaped eye cups and frames; and other comfort features make WILLSON safety equipment "easy on the eyes."



DAILY REMINDERS

Such as Willson "Blind Man" Safety Posters keep workers aware of the need for wearing goggles. Supplies available on request.

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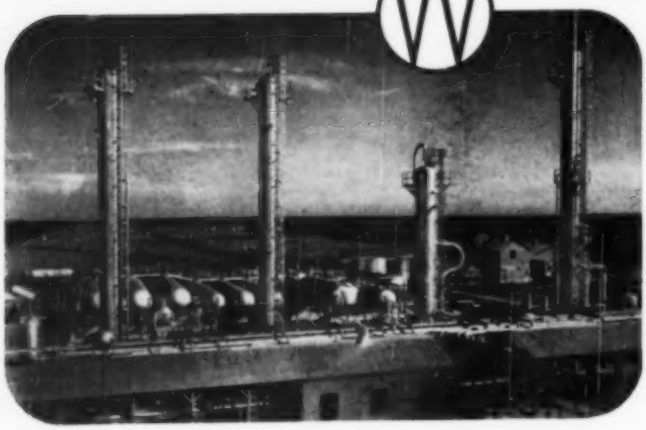
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For STABILIZATION



WARREN PETROLEUM CORPORATION

Western Heat Transfer Equipment plays an important role in the manufacture of stabilized natural gasoline at Warren Petroleum's Holliday, Texas plant, pictured above. Close attention to detail and specification from design to installation is the prime consideration in the manufacture of all Western equipment for gasoline plants, refineries, chemical processing plants and pipe lines throughout the world.

See Western's catalog pages in the current issues of Chemical Engineering Catalog, Refinery Catalog and Thomas Register.

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HEAT EXCHANGERS

Manufactured by
WESTERN SUPPLY COMPANY
P.O. BOX 1888 TULSA, OKLAHOMA
SALES OFFICES — DALLAS — HOUSTON

NAMES IN THE NEWS, cont. . .

son, previously associate director of research and development at J. T. Baker Chemical Co., will consult in the fields of process development and the general field of photographic materials.

E. O. Rhodes has been named a special technical advisor to J. N. Forker, vice president of Koppers Co., Inc., and general manager of its tar products division.

Robert B. Reynolds, associate research director of the Mobile mill of the Hollingsworth & Whitney Co., has been elected first chairman of the newly chartered Mobile-Pensacola section of the American Chemical Society.

John F. Kidde, president of Walter Kidde and Co., Inc., and **Edwin J. Schwanhausser**, vice president in charge of sales, Worthington Pump and Machinery Corp., have been elected to the board of trustees of Stevens Institute of Technology.

Robert G. Baumann has joined the General Electric Co.'s chemical department as assistant sales manager of silicone products, with headquarters at the company's new plant at Waterford, N. Y.

Robert A. Stauffer has been elected vice president and director of research of National Research Corp., Cambridge, Mass.

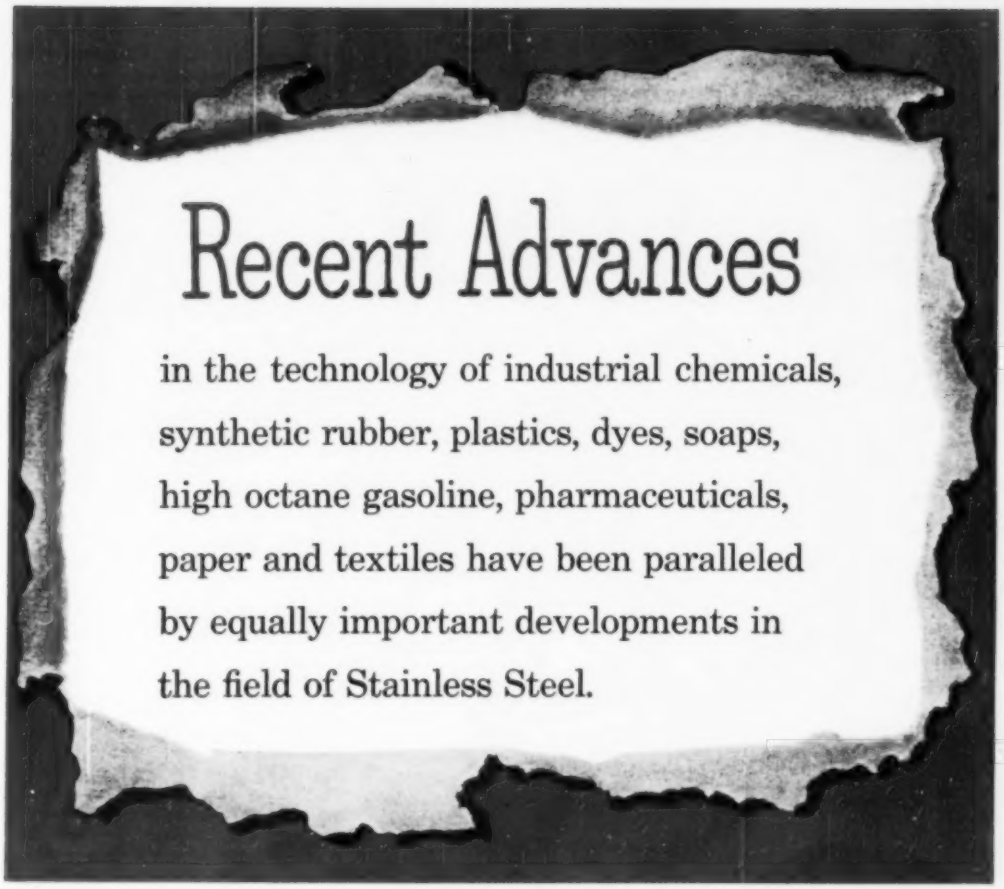
Max Potash, who was previously associated with Publicker Industries, Inc., has joined the staff of the American Polymer Corp., Peabody, Mass.

Bruno Puetzer has been named assistant to E. C. Williams, vice president in charge of research for Schenley Industries, Inc., to specialize in pharmaceutical research. He was formerly director of research for Vick Chemical Co.

Hagop H. Alexanian has joined the air force munitions branch, munitions division, technical command, Army Chemical Center, Md., as a chemical engineer. **Kenneth C. Kennard** has joined the organic branch, chemical division, as an organic chemist.

Evan B. Guth, plant chemist at Plant No. 2 of the Pennsylvania-Dixie Cement Corp. at Clinchfield, Ga., has been appointed plant chemist at the West Penn, Pa., plant of the

Continued



THE versatility of this superior corrosion-resisting and heat-resisting steel group has in recent years been constantly extended so that it is generally safe to say:—*the more severe the service the greater the need for Stainless Steel.*

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A perfect blend in 5 minutes with...

GEMCO *Conical Blender*

CUSTOM-BUILT FOR *Your* JOB!

UNIFORM particle dispersion and thorough blending of dry material, powder or granule before or after pulverizing.

RAPID, smooth, vibration-free operation. (Totally enclosed worm gear drive.)

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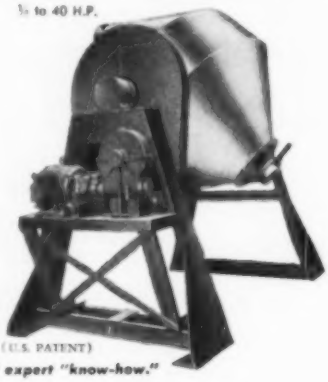
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NAMES IN THE NEWS, *cont. . .*

company. **A. E. Carpenter,** assistant chemist, will succeed Mr. Guth. **Bobby Holtzclaw** has been assigned as assistant chemist.

G. W. Naylor, formerly general manager of manufacturing for Sun Chemical Corp., has been named as manager of the development section, chemical division of Koppers Co., Pittsburgh.

Frank T. Sisco, director of alloys of iron research, has been appointed technical director of the Engineering Foundation, New York.

E. Corbin Chapman has been named chief metallurgist of combustion engineering, Superheater, Inc., New York.

Leon H. Grosby, Edwal Laboratories plant manager at Ringwood, Ill., has taken over direction of the purchasing department in addition to his other duties.

C. Fred Gurnham has been appointed chairman of the department of chemical engineering in the Tufts School of Engineering, Medford, Mass.

S. Charles Rothmann has been named research engineer in the industrial division of the accident prevention department of the Association of Casualty and Surety Companies. He is a specialist in unusual hazards and will develop a series of reports on special chemical hazards.

Warren L. McCabe has been elected a vice president of the Flintkote Co. Dr. McCabe joined the company in 1947 as director of research.

George V. Atkinson has been appointed manager of the decorative fabrics section of Lumite division, Chicopee Manufacturing Corp.

J. B. Crawford, formerly plant manager at the Cicero, Ill., plant of the Union Asbestos & Rubber Co., has been appointed plant manager of the new Union Asbestos & Rubber Co. plant at McGregor, Tex.

Emory N. Kemler of New York City has been appointed associate director of Southwest Research Institute in Houston.

A. G. Bowers, vice president in charge of research and production of the Gerson-Stewart Corp., Cleveland, has been elected chairman of the

(Continued)

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HIGH TEMPERATURE STRENGTH?

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SEAMLESS & WELDED
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TA-1467-S

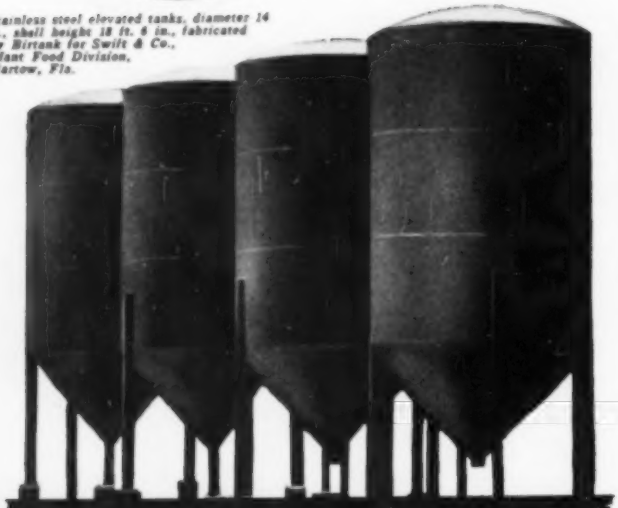
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Stainless steel elevated tanks, diameter 14 ft., shell height 18 ft. 6 in., fabricated by Birtank for Swift & Co., Plant Food Division, Bartow, Fla.



STAINLESS STEEL SERVES YOU BETTER

If you require steel storage or processing vessels of any type or size, let us figure with you on fabricating them from stainless steel. For all practical purposes stainless will serve you better because of its resistance to corrosion, longer life and lower maintenance cost.

Stainless steels are now available in large quantities for quick delivery. To meet the increased demand, we have expanded our fabricating facilities and now can handle larger tonnages, both in solid stainless and stainless clad. Our experienced engineering staff will help in design and choice of materials. Write for quotations.

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NAMES IN THE NEWS, cont. . .

Cleveland section of the American Chemical Society. He succeeds **G. M. Juredine**, technical coordinator of the Harshaw Chemical Co.

D. J. Beaver, research director at Monsanto Chemical Co.'s Nitro, W. Va., plant since 1942, has been transferred to the company's headquarters in St. Louis.

Alexander L. Feild of the rustless division, Armco Steel Corp., has been awarded an honorary degree of Doctor of Science by Stevens Institute of Technology.

Peter J. W. Debye of Cornell University, Nobel Prize winner in chemistry in 1936, has been awarded the 1949 Willard Gibbs Medal of the Chicago section of the American Chemical Society. Professor Debye, will receive the award at a meeting of the Chicago section, on May 20.

Frank K. Signaigo, assistant director of the Du Pont pioneering research section at Buffalo, has been made director of the acetate research section. **Robert M. Hoffman**, manager of the pioneering research section, succeeds Dr. Signaigo.

Henry C. Froehling, manager of the development section of the Du Pont rayon technical division, has been transferred to the acetate division as New York district sales manager of Orlon acrylic fiber. Mr. Froehling succeeds **Charles M. Wenrich**, previously named district sales manager for acetate rayon yarns in the New York district. Succeeding Mr. Froehling as manager of the rayon development section will be **Donald F. Holmes**, now field research supervisor. **D. M. Thornton, III**, group leader, has been named field research supervisor. **W. David R. Straughn**, district sales manager in the Providence office of the rayon division, has been transferred to the acetate division in Wilmington as manager of the technical service section.

O. C. Jones of Anniston, Ala., **R. W. Radue** of St. Louis, **S. H. Rider** of Springfield, Mass., and **Q. A. Trementozzi** of Dayton, Ohio, have been given leaves of absence by Monsanto Chemical Co. at full salary for an academic year of study at universities of their choice.

George B. Creamer of Syracuse, New York, has been awarded the Sylvania division American Viscose Corp.

Continued

ATLANTIC PETROLEUM CHEMICALS

ULTRAWET K

You'll compound a better product with Ultrawet

Ultrawet K in flake form contains 85% active-solids. When you're dry-mixing that's important, because you have greater flexibility in the choice of alkalis and other builders.

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Minimum % Solids:	30	30	35	35	85	85
Minimum % Active-Solids:	85	85	90			
EMULSION BREAKING	✓					
LIGHT-DUTY HOUSEHOLD DETERGENTS				✓		
PENETRANT	✓	✓				
INDUSTRIAL DETERGENTS					✓	✓
HEAVY-DUTY HOUSEHOLD DETERGENTS						✓
EMULSIFIER					✓	✓
WETTING AGENT	✓	✓				
CHARGE STOCK FOR SPRAY AND DRUM DRYING			✓			
DRY MIXING WITH ALKALIS				✓	✓	✓
LIQUID HOUSEHOLD DETERGENTS		✓				
COUPLING AND SOLUBILIZING	✓					

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It consists of an inclined rotating cylinder with lifting flights which shower the material over the entire inside shell area. A fan forces air through steam coils at the discharge end, producing temperatures up to 280° F. Higher temperatures may be obtained by using indirect coal, oil, or gas-fired heaters.

Write for Bulletin 16-C-11 which describes the complete line of Ruggles-Coles Dryers; state pertinent details of your drying problem.

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Names in the News, cont. . .

fellowship for the study of cellulose chemistry at McGill University, Montreal.

Alden H. Burkholder has been named manager of rayon research for Industrial Rayon Corp. **Kenneth M. McLellan** and **George P. Standley** are now assistant managers of rayon research.

William Cabler Moore has retired after nearly 29 years as a member of the research staff of U. S. Industrial Chemicals, Inc., and its predecessor, U. S. Industrial Alcohol Co. He has been active in the work of the American Chemical Society and of the Electrochemical Society, of which he was president in 1946-1947. He plans to devote his time in the future to consulting practice with headquarters in Stamford, Conn.



W. C. Moore



T. W. Evans

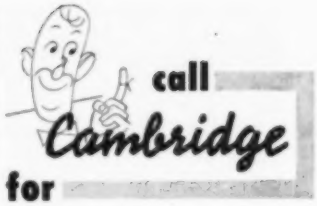
Theodore W. Evans has been appointed director of research for Shell Development Co. Dr. Evans will be in charge of the operation and research program of the company's Emeryville laboratories, the largest commercial research unit in the West.

Ernest J. Storfer has been appointed assistant manager of coating compound laboratories of the Plaskon division of Libbey-Owens-Ford Glass Co., Toledo.

Irving C. Smith has been appointed general manager of Monsanto Chemical Co.'s western division in Seattle, Wash. Mr. Smith has been assistant general manager since January 1948. He was appointed to succeed **Harry P. Banks**, vice president of the company and general manager who has retired. **Robert U. Haslanger**, is now assistant general manager of the division.

William A. Bailey, Jr., is now manager of the research laboratory of Shell Oil Co., Inc., at Martinez, Calif. He was formerly director of the laboratory at the company's Wilming-

(Continued)



INDUSTRIAL WIRE CLOTH OR SCREEN ...from 4" opening to 20x250 mesh

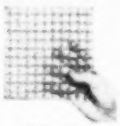


Whether you need material for filtration, screening or fabrication, Cambridge offers you one complete source for any type of wire cloth or metallic screen. Skilled Cambridge craftsmen produce your material from any gauge metal or alloy, to the particular mesh or weave that best suits your requirements.



Call in your Cambridge Field Engineer whenever you need industrial wire cloth. He can offer you *fast delivery on stock or specially woven items.*

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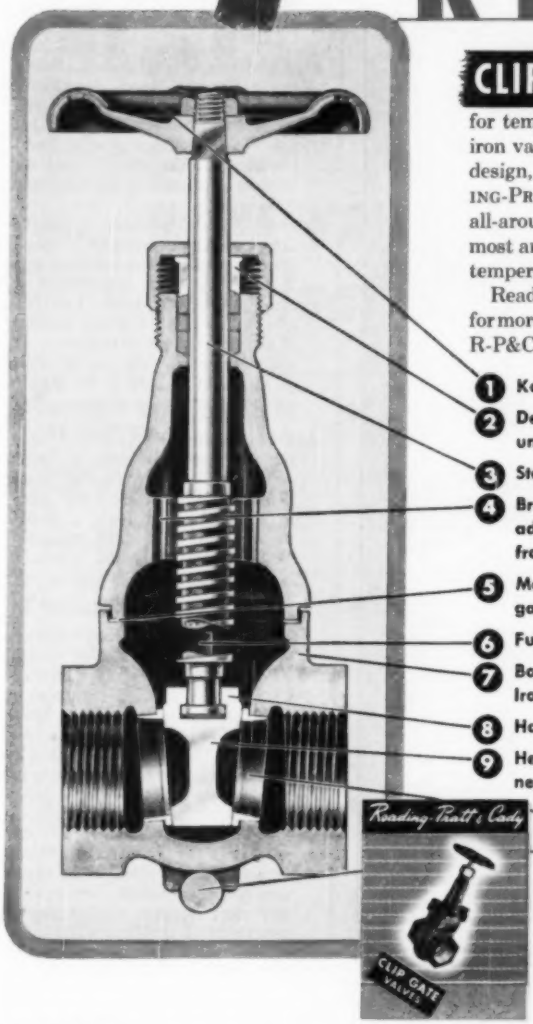
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many features in this R-P&C valve



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Read the highlight features listed below. And for more detailed information, get in touch with the R-P&C District Office or Distributor nearest you.

1. Knol-grip malleable iron ventilated hand-wheel.
2. Deep stuffing box with follower. Can be packed under pressure.
3. Stem of high strength steel or bronze rod stock.
4. Bronze bushing in brass-mounted type. Full, adequate bonnet drain prevents possible trouble from freezing in outside installations.
5. Male and female bonnet joint with asbestos gasket.
6. Full-sized wedge guides cast in body.
7. Body and bonnet of close-grained Electric Cast Iron—50% stronger than ordinary iron.
8. Horseshoe type slip-on connection.
9. Heavy cast I-beam wedge—reversible and renewable. Wedge rises above flow when open.
10. Rolled-in seat ring (in bronze-mounted type).
11. Full U-bolt in closed bolt holes. Held in place by 3 sets of lugs on body.

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NATIONAL AIROIL FUEL OIL GAS BURNERS

THE RIGHT OIL BURNER OR GAS BURNER FOR YOUR JOB

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(For use where steam is available) *atomizes thoroughly* and *burns completely*, the lowest and cheapest grades of fuel oil and tar, requiring only low oil pressure and temperatures.

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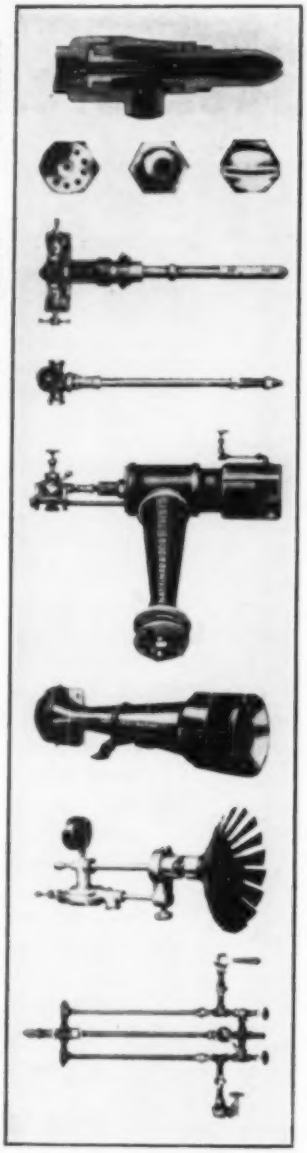
TYPE "SAR"
(Where steam, or gas is available for atomizing) safely and efficiently burns residuums obtained from process.

COMBINATION GAS AND OIL BURNER
— the "AIROCOOL" Gas Burner in combination with a TYPE "SAR" Oil Burner.

"AIROCOOL" GAS BURNER
(Of venturi type) assures low turndown without burnback.

MECHANICAL-PRESSURE ATOMIZING OIL BURNERS
with multi-vane type air diffuser to give a positive swirl to entering combustion air.

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(Refuse Oil Burner) burns acids or caustic oils, sludges, asphalts, tank bottoms, polymer oils, heavy petrolatums, organic oil residuums, waste cutting oils, sulphite pulp liquors, etc.



Whether you burn oil, gas or a combination of these fuels, there's a NATIONAL AIROIL BURNER for your job.

Our more than 36 years' experience in the design, development and manufacture of all types of industrial burners is *at your service*.

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OIL BURNERS and GAS BURNERS for industrial power, process and heating purposes, STEAM ATOMIZING OIL BURNERS, MOTOR-DRIVEN ROTARY OIL BURNERS, MECHANICAL PRESSURE ATOMIZING OIL BURNERS, LOW AIR PRESSURE OIL BURNERS, GAS BURNERS, COMBINATION GAS and OIL BURNERS, AUTOMATIC OIL BURNERS, for small process furnaces and heating plants, FUEL OIL HEATERS, FUEL OIL PUMPING and HEATING UNITS, FURNACE RELIEF DOORS, AIR INTAKE DOORS, OBSERVATION PORTS, SPECIAL REFRACTORY SHAPES.

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INDUSTRIAL OIL BURNERS, GAS BURNERS, FURNACE EQUIPMENT

ton-Dominguez facilities, where he is being succeeded by **Richard A. Bannerot**, senior technician at the southern laboratory.

Sigmond Moroh, an authority on the application of triethylene glycol to air conditioning units, has been named chief engineer of National Air Conditioning, Inc., Johnstown, Pa.

D. D. Morris, general superintendent of the Alberta nitrogen department of the Consolidated Mining and Smelting Co. of Canada, Ltd., has now been appointed general superintendent of the research and development division of the company.

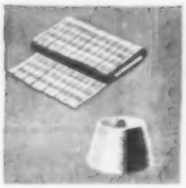
John B. Calkin has been appointed director of the department of industrial cooperation, and associate professor of chemical engineering at the University of Maine. **Lyle Jenness** who has been acting director of the department of industrial cooperation will devote his full time to his duties as head of the department of chemical engineering.

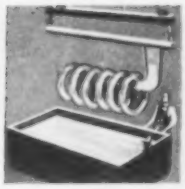
Leo Finkelstein has transferred from the information branch, technical services division, technical command, Army Chemical Center, Md., to the physical branch, chemical division, as a research associate. **William G. McDaniel**, chemical engineer, has joined the operations branch, plants division.

Robert P. Kenney, formerly manager of the international sales department of B. F. Goodrich Chemical Co., has been appointed manager of chemical sales replacing **S. L. Brous** who has resigned to accept a position with the General Electric Co. Named successor to Kenney as manager of international sales is **James C. Richards, Jr.**, formerly sales manager of Hycar rubber and rubber chemicals. **W. D. Parrish**, formerly technical service manager for Hycar and rubber chemicals, becomes the new sales manager of that department and is replaced as technical service manager by **Roger C. Bascom**, Hycar sales representative in the New England territory. **Roger S. Steller** has been appointed to replace Bascom in the New England area.

Leon E. Hoogstoel has been appointed technical director of the board of directors of the Behr-Manning Corp., Troy, N. Y. He was made director of research in 1945.

Continued




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SOLVAY'S NEW SYNTHETIC ORGANIC DETERGENT

gives you this versatile combination of properties

NYTRON HAS EXCEPTIONAL DETERGENCY for use in institutional cleaning, manufacturing plants, industrial processes, dairy cleaning, and in the compounding of a wide variety of products; can be used alone, or combined with acids or alkalies.

NYTRON COUNTERACTS HARD WATER DIFFICULTIES; more economical because increased quantities do not have to be added to compensate for water hardness; completely prevents the formation of scum, grease rings, streaks, spots.

NYTRON HAS HIGH SOLUBILITY; water solutions containing as much as 36% NYTRON can be prepared at 77°F.; will not "salt out" in concentrated solutions of many metallic salts.

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NYTRON REMAINS CHEMICALLY STABLE under extreme conditions of temperature, acidity or alkalinity; suffers no chemical breakdown or loss in detergency when used in solutions of either weak or caustic alkalies.

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NYTRON RINSES THOROUGHLY, QUICKLY in cool or even cold water; does not leave an insoluble deposit.

NYTRON HAS EXCELLENT EMULSIFYING POWER to remove oil and grease from fabrics, surfaces, metal parts.

NYTRON WILL FOAM in any normal concentration of acid or alkali, in distilled or sea water, in ice cold or boiling water.

A SOLVAY PRODUCT

This low-cost synthetic organic detergent is made by a new, exclusive, patented process. It is a basic product with a chemical structure unique in the synthetic organic detergent field. Get detailed information and specific technical data on how NYTRON can help your business.

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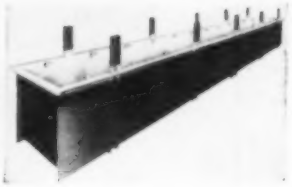
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RUBBER INSULATED EQUIPMENT FOR HANDLING CORROSIVES



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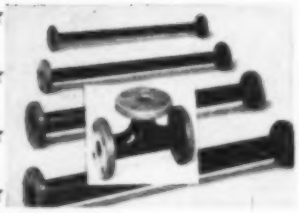
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Ducts, vents, hoods, housings, fabricated and/or rubber lined. All joints companion flanged.



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Flanged type, lined with natural or synthetic rubber. Steel, cast or wrought iron. 1½" I.D. and up.

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NAMES IN THE NEWS, *cont. . .*

Albert F. Metz was elected president and general manager of the Okonite Co., Passaic, N. J. Mr. Metz, who was previously vice president and treasurer of the company, replaced **Frank C. Jones**, who died January 20.

G. V. Slottman has been appointed director of research and engineering for Air Reduction Co.

Thomas K. Sherwood, dean of engineering of Massachusetts Institute of Technology, and **Bruce S. Old** of the staff of Arthur D. Little, Inc., have been elected to the board of directors of Arthur D. Little, Inc., Cambridge, Mass., research and engineering organization. **R. C. Griffin** retired as director and as assistant secretary.

Lyle B. Porter has resigned as director of research for the Illinois Water Treatment Co. of Rockford, Ill., to establish a consulting engineering service, specializing in water treatment and industrial waste disposal, with headquarters in Rockford.

Roland F. Boehm, who was district sales manager of the Houston, Tex., office, of Mathieson Chemical Corp. has been transferred to the ammonia department with headquarters in the company's New York offices. **O. J. Theobald, Jr.**, formerly district sales manager of Mathieson's Charlotte, N. C., office, replaces Mr. Boehm as district sales manager of the Houston office. **J. F. Carey**, formerly a sales representative in the Charlotte territory, has been named district sales manager of the Charlotte office.

OBITUARIES

Paul Fickden, 62, director of purchases of Norton Co., Worcester, Mass., died in Worcester, February 6.

Kirk Brown, 88, founder of the Dunlop Tire Co. of America, and one of the organizers of Bakelite Corp., died in Florida February 13.

Townes Randolph Leigh, 68, died in Florida of a heart attack February 15.

Frank M. Beegle, 59, chemical consultant and president of Protective Coating Corp., Des Plaines, Ill., died February 22.

Eric Burkman, 56 secretary of United States Rubber Co., died of a coronary thrombosis February 26.

How to control and eliminate ODORS



ODORS: PHYSIOLOGY AND CONTROL summarizes all advanced knowledge of odors and offers a unique theory of odor stimulation. It provides extensive information on a variety of measures for the elimination of odors in food, in industry, in the home, and on the person. You're shown the methods being used to combat and eliminate odors, together with many other theories and little known facts about them.

This practical guide gives you a working knowledge of olfactory physiology and control; discusses the relationship between health and odors, the control and abatement of odor nuisances, the legal aspects pertaining to such control, and the enjoyment of odors.

JUST PUBLISHED!

ODORS: Physiology and Control

By Carey P. McCord,
The Industrial Health Conservancy Laboratories, Detroit
and Wm. N. Witheridge,
Ventilation Consultant, General Motors Corporation, Detroit

397 pages, 6 x 9, Illustrated, $6.50

Not only does this volume describe the effects of odors on health but it explains the forward strides medicine, chemistry, and engineering are taking towards controlling and eliminating offensive odors. It explains how offensive odors can cause lowered appetites for foods and waters, impair respiration cause insomnia, mental perturbation, etc.

CONTENTS:

1. The Anatomy of the Olfactory System 2. The Physiology of the Olfactory Sense 3. Chemical Constitution and Odors 4. Odor Classification 5. Odor Detection and Measurement 6. The Pathology and Perversions of the Olfactory System 7. The Influence of Odors on Health and Comfort 8. Human Body Odors in Health 9. Human Body Odors in Disease 10. Odors in the Diagnosis of Disease. 11. Household Odors 12. Odors of Waters and Foods. 13. Industrial Odors 14. The Offensive Trades 15. Air Conditioning and Odors 16. Chemical and Physical Destruction of Odors 17. Odor Masking 18. Odor Cancellation and Counteraction 19. The Sorption of Odors 20. Odors as Warning Agents 21. Odor Repellents and Odor Attractors 22. The Making of an Odor Survey 23. The Legal Aspects of Odor Nuisance

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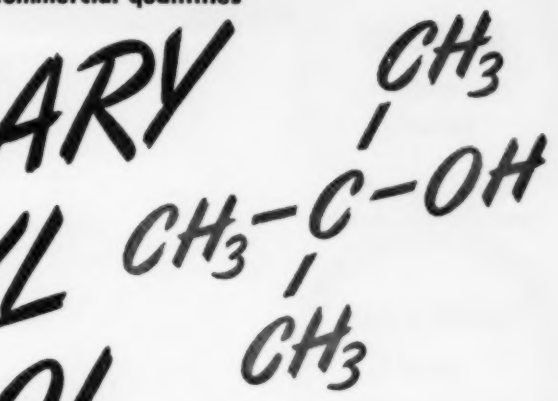
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INDUSTRIAL NOTES

Brill Equipment Co., New York, is consolidating its executive offices with its warehouses and shops at 2401 Third Ave.

Fritzsche Bros., Inc., New York, has added Fred W. Fielding to the staff of its perfume division.

Foxboro Co., Foxboro, Mass., has begun an addition to its building at 5151 Baum Blvd., Pittsburgh, Pa.

Ungerer & Co., New York, has appointed William H. Dunney, Jr., secretary of the company.

Black, Sivalls & Bryson, Inc., Kansas City, Mo., has appointed Harlan L. Mumma as world export manager of the company with headquarters at New York.

Allis-Chalmers, Milwaukee, has named Frank H. Stohr general manager of its Norwood works.

New York Belting and Packing Co., Passaic, N. J., has named Paul J. Breden as southern district manager.

John Nooter Boiler Works Co., St. Louis, has reelected Harry Nooter as its chairman and Elmer J. Nooter as president. R. J. Ryan was given the new title of executive vice president. S. C. Tracy has been elected vice president and treasurer. H. A. Frith, another new vice president, will continue as plant superintendent. Herbert H. Koch has been elected secretary.

Superior Electric Co., Bristol, Conn., reports that J. C. van Groos, West Coast representative, has moved into new quarters at 1436 North Serrano Ave., Hollywood 27, Calif.

S. B. Penick & Co., New York, has appointed Charles A. Myers vice president. He will act as managing director of its essential oils division.

Merck & Co., Inc., Rahway, N. J., has promoted Sidney N. Stokes to the post of New York branch manager.

Minneapolis-Honeywell Regulator Co., Minneapolis, has opened at Amarillo, Tex., a district sales and service

(*Continued*)

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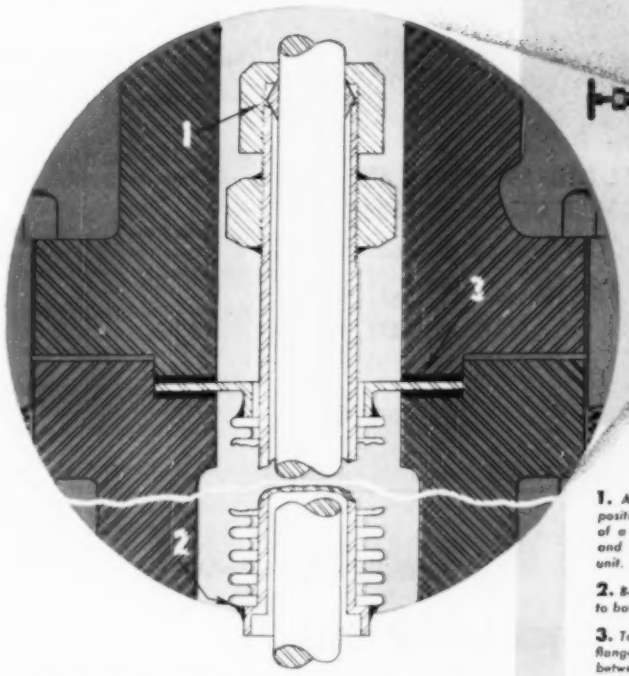
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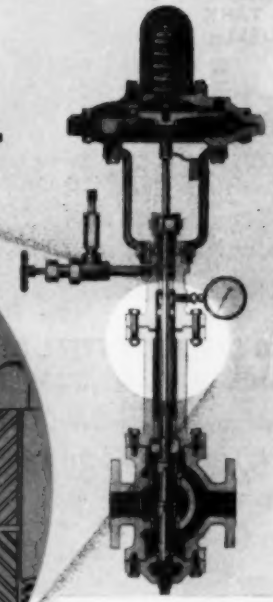
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3. *Top of bellows is seam-welded to flange, which in turn is gasket-sealed between valve bonnet and bellows housing.*

Bellows assemblies are made of Type 347 Stainless Steel. *Replacement involves only the bellows and ferrule . . .* readily accomplished in field. Other distinctive features assure long service life.

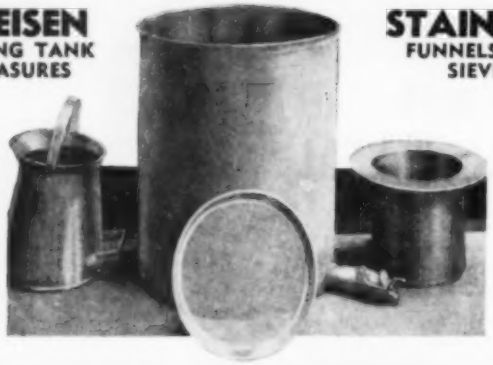
The new-design bellows-seal assembly can be applied to any standard Stabilflo Valve in sizes through 4 inches.

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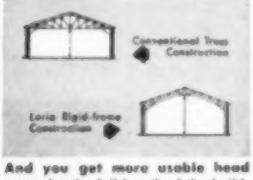




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INDUSTRIAL NOTES, Cont. . .

office of the Brown Instruments division. The new office located at the Barfield Building will be managed by Robert E. Harris who will handle the West Texas-New Mexico area.

Abbott Laboratories, North Chicago, has promoted Louis F. Sladky to be new manager of District 34, with headquarters in Chicago.

Great Lakes Carbon Corp., New York, has elected Robert G. Allen vice president in charge of the electrode division.

Wheeler Insulated Wire Co., Inc., has moved from Bridgeport to Waterbury, Conn.

Hydraulic Press Mfg. Co., Mount Gilead, Ohio, has appointed George A. Daniels secretary and treasurer.

Kuljian Corp., Philadelphia, has appointed Edwin Lundgren its Washington, D. C., representative.

Binney & Smith Co. International, New York, has appointed Charles A. Polachi to the technical sales staff.

Ralph B. Carter Co., Hackensack, N. J., has appointed Charles F. Dougherty as its special sales representative for the oil industry.

Shell Chemical Corp., New York, has transferred its administrative offices to 50 West 50th St.

W. A. Cleary Corp., New Brunswick, N. J., has appointed Robert J. Berglund as sales representative in the lecithin division.

Gits Bros. Mfg. Co., Chicago, has named Frank A. Kovarik general sales manager, to establish and handle a new Michigan branch office.

Stewart Hartshorn Co., New York, has elected Henry W. Harding executive vice president.

Dearborn Chemical Co., Chicago, has named W. R. Wieschendorff district manager of its western offices. His headquarters are in Los Angeles.

Goodyear Tire & Rubber Co., Akron, has appointed sales managers for its chemical division in New York and Philadelphia. They are Donald E. Neese and John W. Bear, respectively.

American Potash and Chemical Corp., New York, declared a quarterly dividend of $1 per share on the $4 cumu-

(*Continued*)

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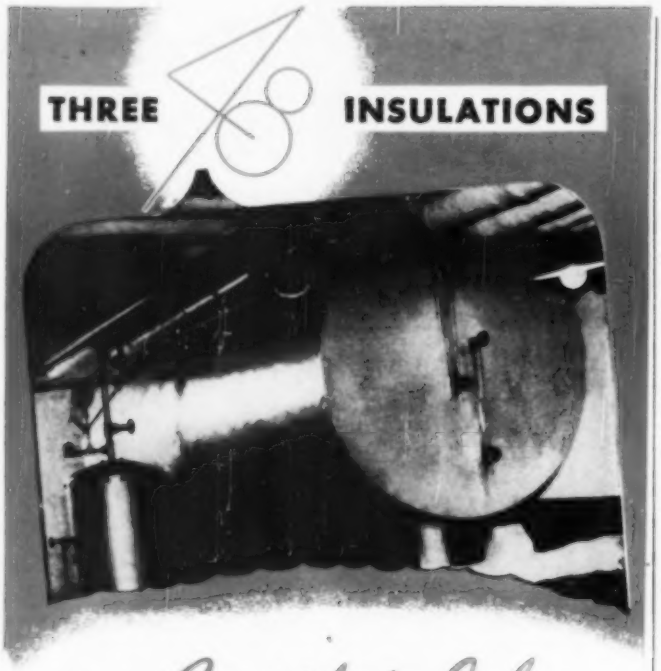
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INDUSTRIAL NOTES, cont. . .

lative preferred stock, Series A. The board also declared a dividend of 37½c. a share on the Class A and Class B stock of the corporation.

Virginia Smelting Co., New York, has moved its offices to 270 Madison Ave.

Hydropress, Inc., New York, has made Carl E. Haugh district sales manager of its eastern and midwestern divisions.

Snyder Engineering Corp., Los Angeles, has established a process equipment division with Raymond J. Selwyn as manager.

Mathieson Chemical Corp., New York, has reported its net earnings in 1948 as amounting to $4,822,812, equivalent to $5.61 on the common stock. In 1947, net income amounted to $2,930,565 equivalent to $3.34 on the common stock.

Combustion Engineering Co., Inc. and Superheater Co. have merged to become Combustion Engineering-Superheater, Inc. Frederic A. Schaff has been elected chairman of the board and vice chairman of the executive committee.

Poly-Cyclo Products Co., Cleveland, announces the appointment of Ray W. Grace as vice president and Ernest A. Munkacsy as secretary and plant production control manager.

St. Regis Paper Co., New York, has declared a regular quarterly dividend of 15c. a share on the common stock. John C. Pace has been made a vice president of the company.

Colorado Fuel and Iron Corp., New York, has named E. L. Klinger to direct the sale of Wickwire rope in the mid-continent area. His headquarters are in Houston, Tex.

General Electric Co., Pittsfield, Mass., has appointed Kenneth J. Barlow manager of sales administration for its plastics division.

Sharp & Dohme, Inc., Philadelphia, has named E. F. Schwab sales manager of its newly consolidated Kansas City-St. Louis district.

Witco Chemical Co., New York, has moved its Chicago offices to the Lincoln Tower at 75 East Wacker Dr.

John Powell & Co., Inc., has organized a technical service department headed by **Kenneth Nash**. Its laboratory has been transferred to its Brook-

(Continued)



BACK IN THE 1880's

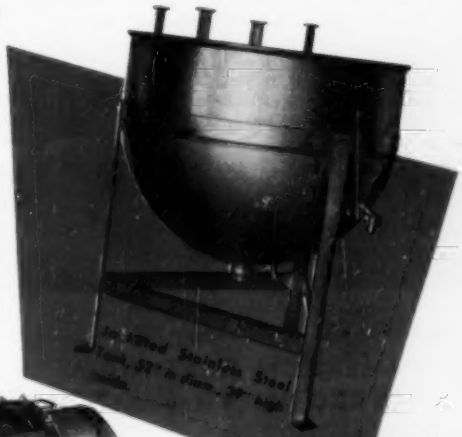
WHEN THE FIRST ELECTRIC ELEVATOR WAS INVENTED

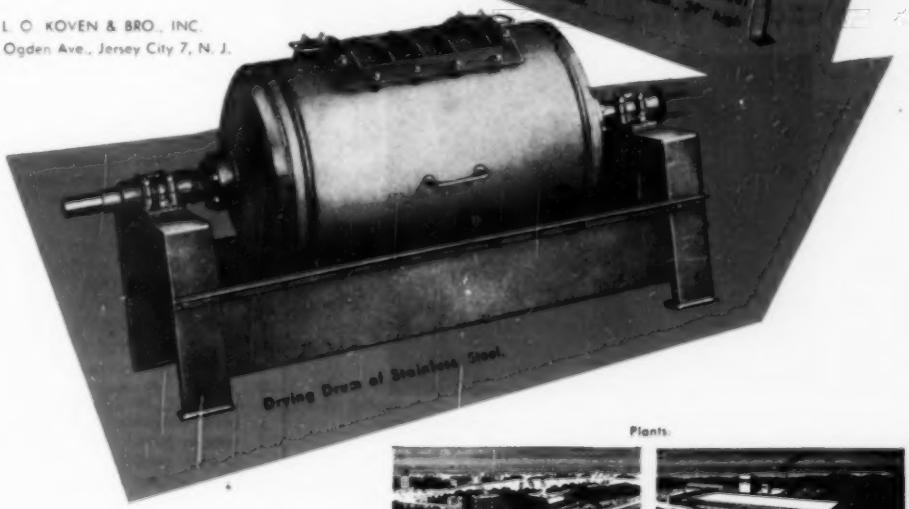
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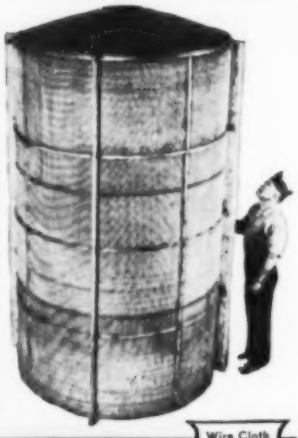
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lyn plant and its San Leandro, Calif., plant has been closed to make way for the opening of entirely new facilities.

Dolphin Paint & Varnish Co., Toledo, has re-elected all directors. They include C. W. Blum, J. R. Blum, C. R. Banker, L. E. Comes and M. W. Winkle.

E. I. du Pont de Nemours & Co., Wilmington, has appointed W. James Latimore district manager of the Houston-New Orleans district with headquarters at Houston.

General Electric Co., Pittsfield, Mass., has named Alden K. McCollum manager of its laminated plastics plant at Coshocton, Ohio.

Foundry Equipment Co., Cleveland, has purchased the industrial oven business of Young Bros. Co. of Detroit.

Pulmosan Safety Equipment Corp. has moved to 644 Pacific St., Brooklyn 17, N. Y.

McCarthy Oil & Gas Corp. has sold to the Metropolitan Life Insurance Co. $15,000,000 of 4 percent 10-year first mortgage bonds of its wholly-owned subsidiary, McCarthy Chemical Co.

Brooks Boiler Treatment Co., Cleveland, has leased a four story building on East 87th St., Cleveland, for more manufacturing facilities. Machinery and equipment were also acquired.

Pennsylvania Salt Mfg. Co., Philadelphia, has appointed Donald W. Graham district sales manager of the heavy chemicals division for the Cincinnati sales office.

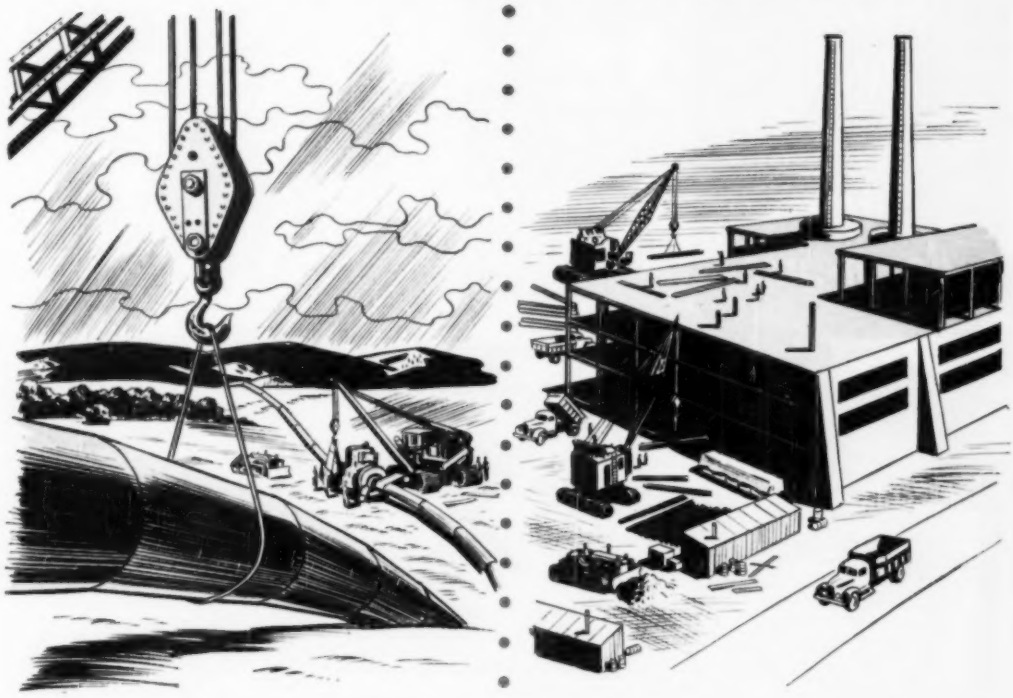
Rapids-Standard Co., Inc., Grand Rapids, has elected George R. Brockway vice president in charge of sales. Wendell A. Smith, credit manager, has been elected an assistant secretary-treasurer.

Isolantite, Inc., Lyndhurst, N. J., has been reorganized with Frank J. Stevens as president. Paul H. Mouraud is vice president and treasurer and John Simons is secretary.

Emulsol Corp., Chicago, has broken ground on a new addition to its organic chemical plant in Chicago. It will cost about $150,000 and be used as warehouse space and possibly later for additional manufacturing facilities.

—*End*

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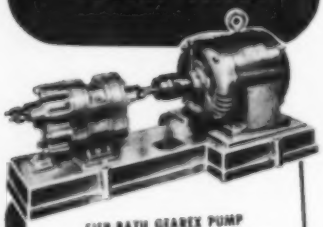
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ENGINEERING

. . . A New Industry Coming

James M. Todd

The next economically important "great new industry" will not be television or nuclear energy, but a group of industrial developments in the field of the heavy chemicals. Emergence of a new industry comparable in growth to the automobile, radio or aviation industry, would be a godsend to a world plunging forward into an uneasy peace. Such a development will be in the field of heavy chemicals but it is anybody's guess as to what the new industry would be.

The developments in the heavy chemicals field will include a lot of chemicals, organic as well as inorganic, that we do not now think of as being heavy chemicals in the sense of being produced in carload lots.

When the new industry emerges, engineers will be in the midst of it, responsible for its growth and quite possibly for its inception. Such a role is but one aspect of a traditional activity of engineers: operating, maintaining and extending the material basis of civilization.

James M. Todd, consulting engineer and president, American Society of Mechanical Engineers, before the Round Table Club, New Orleans, Jan. 13, 1949.

NUCLEONICS

. . . Baseballs Aplenty

J. A. Campbell

In spite of all the supposed secrecy about the bomb it is easy to show that the explosive charge weighs in the neighborhood of 20 to 30 lb. and occupies a sphere of 3 or 4 in. in diameter —about the size of an indoor baseball.

In terms of atomic bombs, there is enough material in sight to fabricate at least ten thousand. New mines are being discovered monthly throughout the world. Any country with a considerable land area is bound to have available sufficient stocks of fissionable material for bomb production, at least.

J. A. Campbell, Oberlin College, before Erie Section, American Chemical Society, Meadville, Pa., Jan. 13, 1949.

TRANSPORTATION

. . . Half as Many Tons

W. T. Faricy

Replying to those who contend that in seeking higher freight rates the railroads will "price themselves out of the market:"

From the standpoint of relationship between prices in general and railroad rates this certainly is not the case. In fact, the relationship which has existed in the post-World War II period shows that the ratio of freight rates to wholesale prices at destination of commodities transported by rail has been lower than at any time since the Bureau of Transport Economics of the Interstate Commerce Commission has been keeping figures on the subject.

For example, to move a carload of wheat or cotton or coal to market takes the proceeds from the sale of only about half as many bushels or bales or tons as it did in 1939. And what is true of these basic commodities is true, in greater or lesser degree, of most things which are produced and shipped.

William T. Faricy, Association of American Railroads, before Atlantic State Shippers Advisory Board and the Traffic Club of New York, New York, Jan. 13, 1949.

DETERGENTS

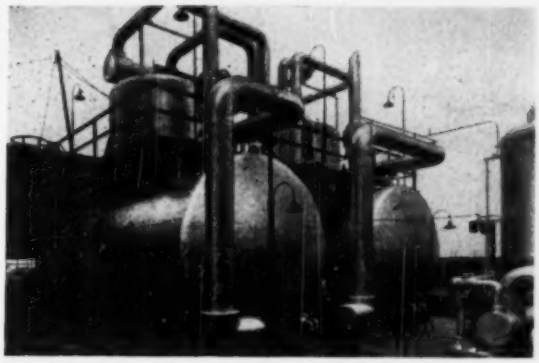
. . . A Billion Pounds a Year

J. B. Niederl and M. E. McGreal

Synthetic detergents used in the household field accounted for 20 to 25 percent of all package soaps sold during 1948. This compares with 2 percent in 1945, and 9.5 percent in 1946.

It is estimated that total production of synthetics in 1948 for all uses was about 270,000,000 lb., and consumption may reach 300,000,000 to 350,000,000 lb. in several years. These figures are for a 100 percent active material, and on a dilute basis will be

(Continued)



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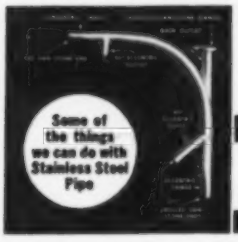
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in excess of 1,000,000,000 lb. a year.

Plant expansion in 1948 and that scheduled to come in during early 1949 should appreciably increase the 1947 production figures as reported by the government, especially for the alkyl aryl sulphonates, workhorses of the synthetic detergents. In fact, there are signs that this increased production will be more than is required in 1949 and for several years hence.

For the past several years, some synthetics have enjoyed a price advantage over soap. However, tallow has dropped in price from approximately 27 c. per lb. in January 1948 to about 12 c. per lb. in January 1949, which may change the price advantage in favor of soap. Nevertheless, quality synthetics, because of their many superior properties, are expected to continue to find increased use in both the industrial and household fields.

Such progress has been made in the compounding of improved detergents that the synthetic agents can now compete with soap powders for almost every use in both hard and soft water.

J. B. Niederl, New York University, and M. E. McGreal, St. John's University, before Philadelphia Section, American Chemical Society, Philadelphia, Jan. 20, 1949.

ANALYSIS

. . . *Kinetic Methods*

I. M. Kolthoff

It's not what happens inside a test tube, but how fast it happens, that tells the tale in a new method of analyzing chemicals.

It is remarkable that up to now hardly any use has been made in analysis of reaction kinetics, the branch of science dealing with the speed of chemical changes and the energy involved. Industrial analysts, who must repeat their tests from day to day on different batches of material, can often employ techniques of reaction kinetics to draw up tables that will reduce the analysis to a simple routine.

Two compounds which react in the same way with a given chemical but at different speeds can be analyzed by means of their rates, for example, methyl formate and methyl acetate which form soapy materials with alkalis. The formate is changed far more rapidly than the acetate, and so after the reaction has proceeded for about an hour, a chemist can examine the mixture and calculate with a minimum of time and effort the concentrations in which the two chemicals were originally present.

Analysis by reaction kinetics has already contributed greatly to the understanding of the molecular structure of

(*Continued*)


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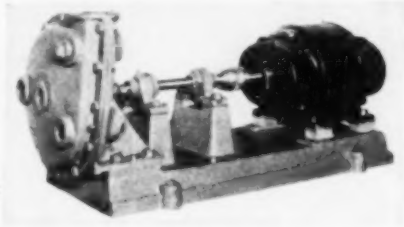
Molasses

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etc.

Many heavy, viscous liquids can be pumped only at high temperatures. Sulphur, for example, if not kept hot enough, would solidify and clog the system. To meet difficult requirements such as this, Lawrence engineers design steam-jacketed centrifugal pumps for the specific liquid and temperature range involved. Illustrated is a regular side-suction pump entirely enclosed in a steam jacket which also covers the intake and stuffing box. The pump and liquid within are kept at the steam temperature. Write us the details of *your* pumping problem. We'll be glad to discuss it with you—without obligation.

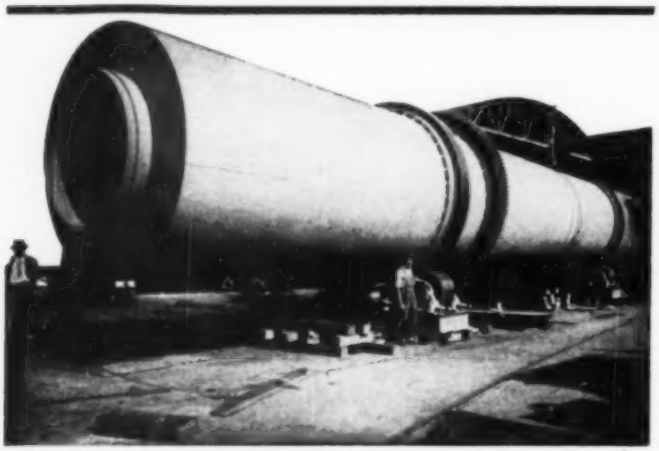


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synthetic rubber. The carbon atoms in rubber are bound together with electric charges known as double bonds and single bonds, according to their strength. When the double bonds are near the surface of the molecule, the rubber reacts more readily with perbenzoic acid than when the double bonds are internal.

I. M. Kolthoff, University of Minnesota, before Pittsburgh Section, American Chemical Society, Pittsburgh, Jan. 20, 1949.

ASTRONOMY

. . . *85% Hydrogen, 15% Helium*

O. C. Wilson

Some 25,000 absorption lines have been mapped in the solar spectrum. Through comparison with laboratory spectra, the presence of some 66 of the 92 odd known elements has been established in the solar atmosphere. The missing elements, which may actually be present and escaping detection, are either extremely rare terrestrially or have absorption lines falling in regions of the spectrum inaccessible to observation.

Quantitative treatment of the spectral data indicates, so far as the results have been carried, a rather uniform mixture of the chemical elements in various celestial objects. Particularly noteworthy is the tremendous preponderance of the two lightest elements, hydrogen and helium. It would not be far wrong to say, so far as numbers of atoms are concerned, that the universe is composed of about 85 percent hydrogen and 15 percent helium with mere traces of the remaining elements as impurities.

O. C. Wilson, Mt. Wilson and Palomar Observatories, before Southern California Section, American Chemical Society, Jan. 7, 1949.

DETERGENTS

. . . *Three Types*

L. D. Callans

Of the three types of detergents, the anionics today hold by far the major part of the market. You are all familiar with the big-name products currently being sold on a nationwide basis. The fatty alcohol sulphates—such as Dreft—and the sulphated monoglycerides—for example, Vel—are outstanding examples. Most housewives know that their soapless soaps pour from boxes in the form of small discrete beads. They foam copiously. They are unaffected by hard water, do not leave a scum in the sink or a

(*Continued*)



. . . and they specify LaBOUR

Although it is a non-priming pump, this LaBour Type Q is operating successfully with a nine foot suction lift. The Q was chosen for its known vapor capacity, since the liquid handled —waste from a plating plant—is gaseous. It is also highly corrosive, as it contains chromic, hydrochloric, and sulphuric acids plus cyanide, with varying amounts of free CO_2 gas.

This pump has been in service 24 hours per day for about two years. It was recently taken down for inspection, and no sign of corrosion was found either on the pump casing or the impeller.

Here is another example of the true economy you get with LaBour pumps. Chemical plant operators have had 27 years of such examples. Old-timers—and many an observant new-comer, too—know when the job is tough they need LaBour . . . and they specify LaBour.

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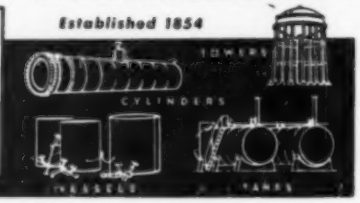
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ring in the bathtub. They remove fats and greases with relative ease. They come in about as large a package as the popular brands of soap at about the same price.

Typical non-ionics which are good detergents are liquids, and this physical form naturally increases the cost of packaging and creates the problem of breakage. However, a notable example of liquid detergent is Glim, now being sold by B. T. Babbitt. Glim has the same characteristics of high detergency in either soft or hard water that anionic detergent products have; and as to price, it appears to be in line with or lower than its competition.

Cationics in the main are relatively inefficient detergents. In the odd cases where detergency is good, poor rinsability and cost tend to limit their consideration. The cationics, limited in this discussion to the quarternary ammonium salts are, however, now recognized as outstanding bactericides, and more and more are gaining recognition as a suitable means for sanitation.

Lee D. Callans, General Aniline & Film Corp., before Association of American Soap and Glycerine Producers, New York, Jan. 27, 1949.

ANALYSIS

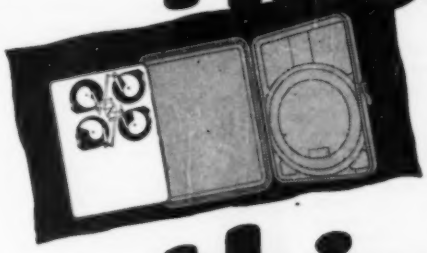
. . . *Mercury Vapor Detection*

Fred Stitt & Y. Tominatsu

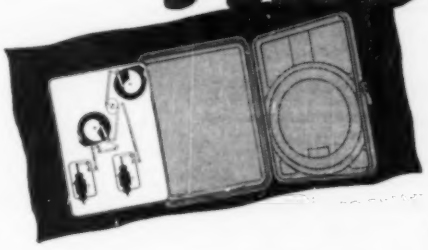
A method has been developed for preparing sensitized paper which is both uniform and reproducible (within 10 percent) in its response to mercury vapor. Filter paper is impregnated with red selenium by soaking in selenocyanate solution, draining, and exposing to a hydrogen chloride atmosphere. The quantity of reactive material per unit area of paper is easily controlled by adjusting the concentration of selenocyanate. The properties of this selenium paper are compared with those of selenium sulphide papers prepared by three different procedures when each is used in the form of a strip over which a fixed volume of sample is slowly passed. A temperature of 65 deg. C. or above was required for maximum reactivity of the mercury vapor with the reactive material on each of the sensitized papers. The length of blackening of selenium sulphide paper produced by a sample containing a fixed amount of mercury vapor may increase markedly as the temperature is increased from 100 to 200 deg. C., due primarily to sublimation of sulphur from the paper. This temperature sensitivity of re-

(Continued)

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sponse is minimized by use of selenium paper. The length of blackening of selenium paper is directly proportional to the mercury vapor concentration of the sample under conditions where this is not true of some selenium sulphide papers. Both selenium and selenium sulphide papers have retained their original calibration after a year of storage at room temperature in the dark.

Fred Stitt and Y. Tomimatsu, Western Regional Research Laboratory, before Division of Analytical and Micro Chemistry, American Chemical Society, San Francisco, March 30, 1949.

LUBRICATION

. . . *New Tests Needed*

H. C. Mougey

It is apparent that "quality" of oils cannot be measured by the conventional laboratory tests for chemical and physical properties even though it may be possible to determine if an unknown oil resembles another oil whose performance in service is known.

The way to determine whether an apple is good to eat is to eat it. The way to find out if an oil is good is to use it in an engine. The only real measure of quality of a lubricating oil is its performance in service.

At the present time there are no generally recognized tests to evaluate oils in many respects. Needed now by researchers are tests to determine: (1) The ability of oil to decrease wear of engine parts in light or intermediate service. (2) The effect of the oil on the formation of combustion chamber deposits, which may affect the anti-knock requirements of the engine. (3) The effect of the oil on exhaust valve burning. (4) The effect of oil on the life of spark plugs. (5) The rate of oil consumption as it is affected by the formation of deposits in the engine by ring wear and cylinder wear due to corrosion.

H. C. Mougey, General Motors Corp., before Ohio State University Diamond Jubilee Celebration, Columbus, Jan. 28, 1949.

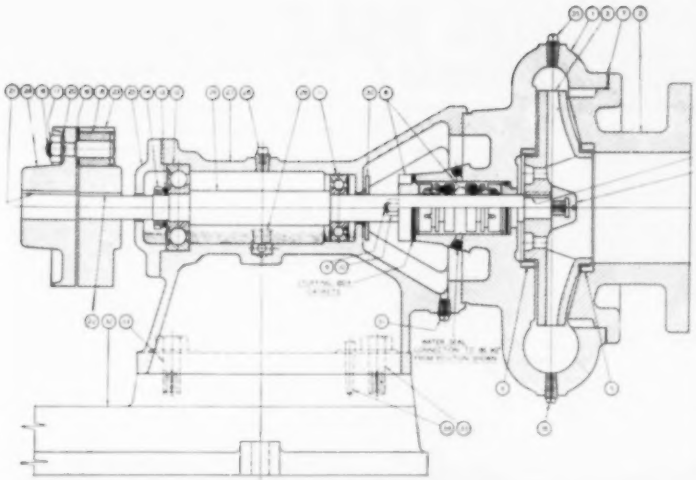
AIR POLLUTION

. . . *Smog Review*

H. F. Johnstone

Science and engineering have kept pace with the demands of industry and of the municipalities for the elimination of atmospheric contamination. The individual problems are often complex and influenced by local meteorological and topographical conditions. New methods of sampling and analysis of the gases and acrosols, how-

(Continued)



1. Shell
2. Side Plate
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7. Gasket (Side Plate)
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11. Ball Bearing (Guide)
12. Ball Bearing (Thrust)
13. Ball Bearing Lock Washer
14. Ball Bearing Lock Nut
15. Runner Key
16. Coupling Bolts
17. Coupling Bolt Nuts
18. Coupling Bushing
19. Fibre Washers
20. Lock Washers
21. Key for Driven Half of Coupling
22. Key for Driving Half of Coupling
23. Driving Half of Coupling
24. Driven Half of Coupling
25. Bearing Thrust Cover
26. Shaft
27. Bearing Stand
28. Plug (Top of Bearing Stand)
29. Oil Levelling Cup
30. Flinger
31. Plug (for Drain of Bearing Stand)
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33. Cap Screws for Subbase
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ever, can be used to identify the nature and source of objectionable pollutants. Smoke and dust are no longer the major problems in air hygiene. These can be controlled, as demonstrated by the notable improvements in air sanitation made through the smoke-abatement programs of several cities. Physiological effects on animals and plants may be produced by extremely small concentrations of gases and vapors. Much remains to be learned, however, concerning the effects of aerosols and their contribution to health hazards. Fumes and mists of organic and inorganic materials contribute to low visibility, affecting airplane and automobile traffic.

Elimination of these nuisances is best accomplished by treatment at the source, either to prevent the formation of the undesirable compounds, or to remove them before discharge. New devices and improvements are available for removing submicron particles from gases, even when it is necessary to treat large volumes and when the contaminant is present in very low concentrations. Treatment of waste gases often involves disposal problems, as well as simple removal of the contaminant. Economic considerations may indicate the desirability of construction of tall stacks, and discharging obnoxious gases under controls based on meteorological and seasonal conditions.

H. F. Johnstone, University of Illinois, before Division of Industrial and Engineering Chemistry, American Chemical Society, San Francisco, March 28, 1949.

VEGETABLE OILS

. . . *Copra and Coconut Oil*

H. V. Gilmore

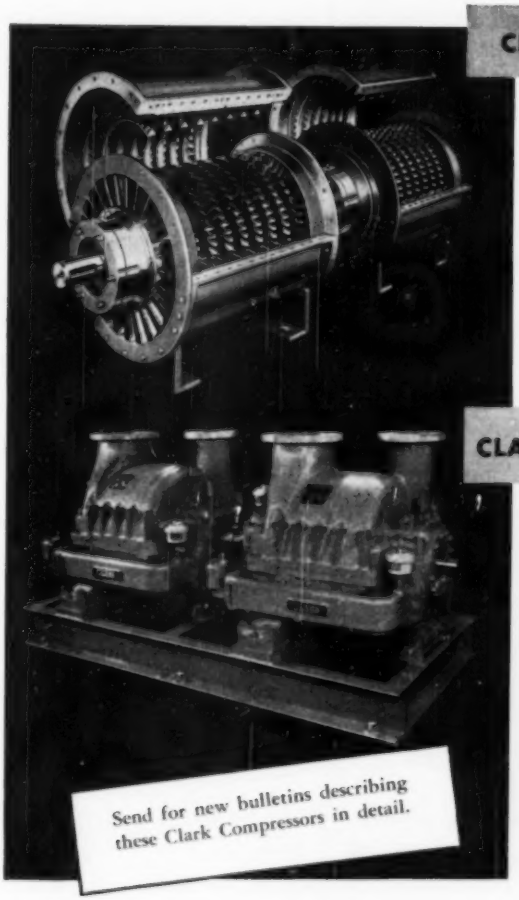
Seed oils derived from palms are distinguished from other glycerides in being almost entirely composed of the lower molecular weight fatty acids—those from caprylic through palmitic. Their major ingredient is lauric acid, a saturated acid with about two-thirds the molecular weight of stearic or oleic acid.

In this country the use of coconut oil in margarine has declined considerably in the past ten years; and only minor amounts of coconut oil and the other lauric acid oils are used in the usual household shortenings. They find some use in shortening for crackers and the frying of potato chips. Sizable volumes are consumed in coating compounds to give certain baked goods a glaze, as the fat base for biscuit fillings and coatings, as the fat base for chocolate coatings not labeled "chocolate," and in sweet coat-

(Continued)

NEW CLARK COMPRESSORS

FOR HIGH PRESSURES AND LARGE VOLUMES



Send for new bulletins describing these Clark Compressors in detail.

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● Clark Axial-Flow Compressors are high-capacity, high-efficiency machines, especially valuable in the volume range of 20,000 to 300,000 CFM. Adiabatic efficiencies up to 85 per cent are obtainable in industrial units built to standard specifications. Efficiencies up to 90 per cent are obtainable on special order.

These compact, lightweight units are suitable for electric motor, steam turbine or gas turbine drive. Clark gas turbine drives, reflecting latest developments in research and design, are built on order to customer specifications.

CLARK *Centrifugal* AIR COMPRESSOR

● Shown here are two Clark No. 2 Centrifugal Air Compressors in series, which deliver approximately 6000 CFM of free air at 110 psig pressure. Both cases of five (5) impellers each are coupled for direct drive by one 1450 HP steam turbine operating at 9400 RPM.

This Multi-Stage Clark Centrifugal Compressor of improved design is compact in size, light in weight, and dependable in operation.

Clark Bros. offer a complete line of standard, high capacity centrifugals for air or gas for volumes up to 120,000 CFM and pressures up to 900 psig. A number of Clark Centrifugal Air Compressors for 100 psig duty have been built with power requirements from 1400 to 22,000 BHP. Also several sizes have been built for the compression of hydro-carbons, oxygen and sulphur dioxide for pressures up to 450 psig.

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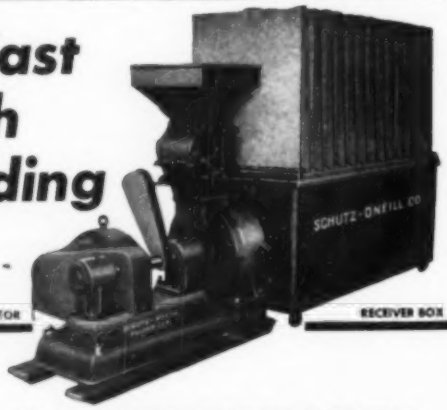
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PHOSPHORUS PENTACHLORIDE	POTASSIUM CHLORATE
PHOSPHORUS PENTASULFIDE	POTASSIUM PERCHLORATE
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Sizes from 12" up to 28", with capacities up to 2,000 lbs. per hour. Ask our engineers to analyze your requirements. No obligation.

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ings for ice cream, candies and pastries.

Turning to inedible products, the major use for coconut oil is in soaps, where it is the most important vegetable oil used. It is also used in baking-type alkyd resins and occasionally in lubricating greases. Combined with minor amounts of castor or peanut oil it is sulphonated for use in textiles and leathers. It is hydrogenated under high pressure and temperature to produce a mixture of fatty alcohols corresponding to fatty acids. These alcohols are then sulphonated and neutralized to produce crude sodium lauryl sulphonate. Finally, it may be split into fatty acids and glycerine. The fatty acids may be used mixed or fractionated into the component individual acids.

Coconut and its related oils are still the best source of glycerine. The fatty acids themselves are usually reacted with alcohols to form esters, with metals to form soaps, with hydrogen to form alcohols, with various nitrogen compounds to form amides, amines, nitriles and quaternary ammonium compounds. At the present time only four acids are being recovered: caprylic, capric, lauric and myristic. Other acids that may be recovered are palmitic and caproic.

Synthetic detergents are making quite a dent in the soap industry's use of coconut oil. The picture may change when the price of copra and coconut oil drops back to a competitive figure, not only because a good soap without an excessive content of builders can compete with the petroleum product, but because the alkyl sulphonate type of detergent was originally made from coconut oil. Whereas other fats will face severe competition from each other as well as from the petroleum industry, coconut oil has many new uses to look forward to.

H. V. Gilmore, El Dorado Oil Works, before Western Chemical Market Research Group, San Francisco, Nov. 4, 1948.

INSECTICIDES

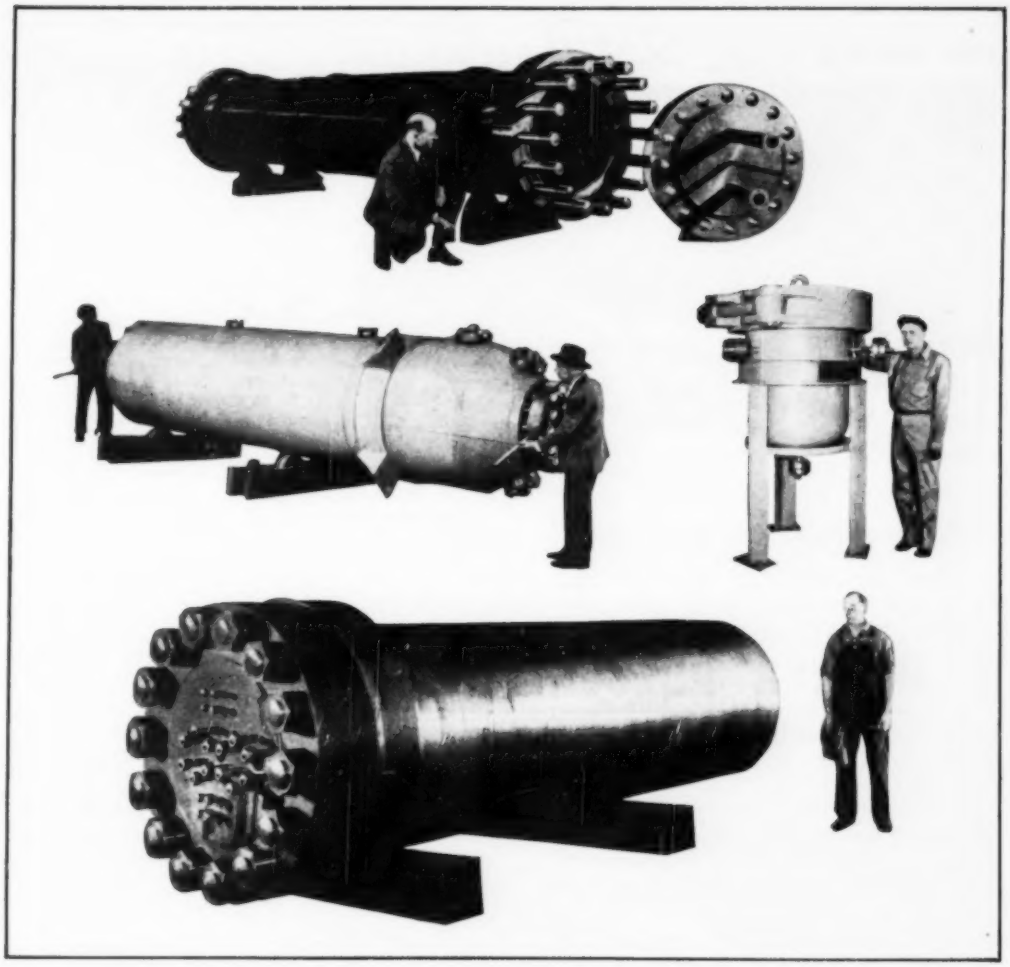
. . . *In the Peel*

L. A. Gunther

Traces of both DDT and parathion, another potent insecticide, have been found in the peel but not in the pulp of harvested oranges, lemons, and grapefruits.

Based on the weight of the peel, from 17 to 23 ppm. of DDT and 3 to 5 ppm. of parathion were present in the peel of Valencia oranges six months after treatment with the standard dosage. These values varied with the type of citrus fruit studied.

(Continued)



Recent Types of Bethlehem Pressure Vessels

The forged high-pressure vessels shown here are a few of the many produced by Bethlehem during the postwar period. Varying widely in size and design, they illustrate several of the distinct types Bethlehem is equipped to build.

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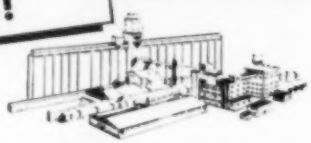
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As a result, the Prater Dual-Screen Pulverizer is standard equipment at Central Soya's Solvent Extraction Plants at Gibson City, Illinois; Decatur, Indiana; and Marion, Ohio.

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the time of application, the time of sampling, dosage, and other factors.

Neither DDT nor parathion has been found in the pulp of apples or pears immediately following treatment with standard dosages of these insecticides. Similiarly no DDT was found in the pulp of peaches and plums when tested.

In olives, 11 to 12 ppm. of DDT was found absorbed eight months after treatment with standard dosages. The DDT content of olives was not altered during alkaline brine processing. Approximately 0.2 ppm. of parathion was found in olives six weeks after treatment.

As to surface residues of these insecticides, DDT was found on citrus fruit surfaces in the ratio of less than 1 ppm., and parathion in the ratio of a tenth of part or less per million.

Residues of DDT on apples and pears do not penetrate the peel and are found in relatively small amounts on the surface only. It is well established that if DDT sprays are applied as recommended by entomologists, they generally do not exceed the informal tolerance for apples and pears of seven parts of DDT per million parts of fruit.

When parathion was applied in recommended dosages and at least 30 days before harvest, less than 0.1 ppm. was found present on the surface of apple and pear fruits. Somewhat higher amounts were present on peaches. Parathion was not detected in cider pressed from apples bearing low-level surface residues. This may possibly result from a close association of the parathion with the wax coating the fruit.

F. A. Gunther, G. E. Carman, W. H. Ewart, M. M. Barnes, M. I. Elliott and R. C. Blinn, University of California Citrus Experiment Station, before Division of Agricultural and Food Chemistry, American Chemical Society, San Francisco, March 30, 1949.

MAINTENANCE

. . . *Cleaning Heat Transfer Equipment*

P. F. Dougherty and C. H. Brooks

Cleaning methods for tubular heat transfer equipment fall into two general classes. The first consists of those methods which perform the cleaning without dismantling the equipment, by means of the circulation of a solution which chemically and/or physically removes the fouling material. The second class includes all those methods where the equipment is partially or wholly dismantled, and the fouling agent removed by a purely mechanical means.

(*Continued*)

You Get All 3

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RUGGEDNESS . . .

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He wants a meter that will give him accurate readings. He wants a meter that can be easily adapted to widely varying conditions. He wants a meter that is rugged enough to remain in service even under adverse operating conditions.

The Republic Pneumatic Transmitter has a guaranteed accuracy of within ½ or 1% of the transmitter range. This is higher than can be consistently secured and maintained with any other method. By making a few minor adjustments or substituting a few small parts its operation can be easily changed to any desired range between a minimum of 0—0.6" of water to a maximum of 0—704" of water. Its construction is more like that of a precision machine than of the sensitive instrument that it is.

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The Republic Transmitter is a pneumatic metering device. It employs the force-balance principle to convert process variables such as flow, liquid level, pressure or liquid density, into air pressures which vary proportionally with the process variables.

These air pressures become direct measurements and can be conducted to reading instruments or used as the measuring impulse for the actuation of an automatic controller.

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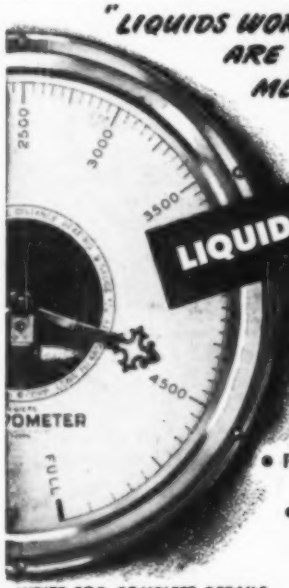
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The adaptability of the "in-place" methods must be determined by physical and chemical examination of the fouling substance. Laboratory solubility tests must also be made of the material. A plant scale test under close supervision should then be made, if it be found in the laboratory that a significant portion of the fouling material be soluble.

If no suitable method is found for cleaning in place, one of the various mechanical methods must be used. The selection here will be determined by the nature of the deposit and extent of the deposit as well as other factors which will be discussed later in the paper.

It is obvious that the efficiency of cleaning and frequency with which it must be performed, can only be determined by periodic heat transfer surveys. In many cases, however, it should be possible to establish certain criteria which may be used by the operators, without the necessity of performing a complete survey.

In order that equipment may be cleaned in place the fouling material must be capable of removal by one of the following methods: (1) Chemical reaction with, and subsequent solution in, an acidic or alkaline solution. (2) Solution of a portion of the fouling material in the cleaning fluid, thus permitting the undissolved portion to be flushed out. The cleaning fluid may be hot or cold water or acidic or alkaline solutions. The flushing agent may be the cleaning fluid used or another liquid or emulsifying oil. (3) Suspension of the fouling agent in the cleaning fluid. (4) Complete solution of the fouling agent or of the binder in an organic solvent. (5) Combinations of these methods.

Experience indicates that cleaning in place has the following advantages: (1) Down-time for equipment is reduced. (2) Dismantling of equipment with resultant damage and high labor cost, is avoided. In those cases where tube bundles cannot be removed, no other methods are available for cleaning the shell side. (3) Cleaning is more thorough. The solution will clean parts which would be difficult or impossible to reach with cleaning tools. (4) Cleaning is more uniform. There are no small particles of scale remaining on the surface. (5) There is practically no loss of metal. (6) Metal surface is left smooth in contrast to mechanical cleaning which frequently results in scoring which provides a place for lodgment of fouling material.

Prior to the adoption of an in-place method of cleaning a particular piece of tubular equipment, investigation

(*Continued*)

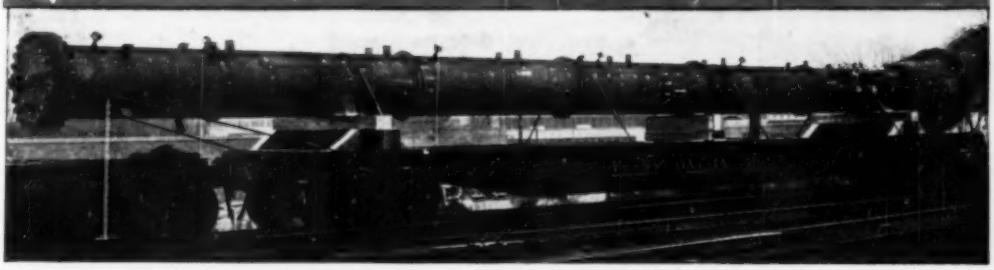
VESSEL DIVISION

NEWS

A. O. Smith 75th ANNIVERSARY 1874 · 1949

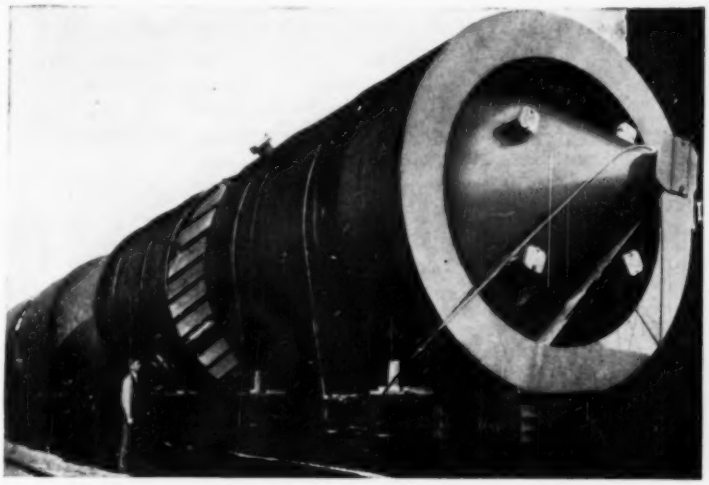
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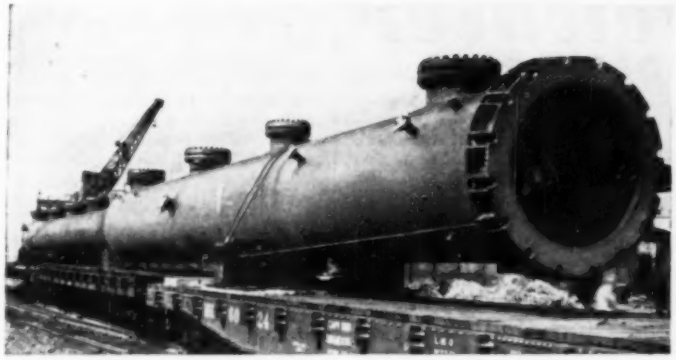


INTO EVERY SMITHlined FAT-SPLITTING TOWER, like the above 68-ft.-long SMITHway Tower, goes the experience and knowledge gained from a long and extensive program of research and development into the corrosion problems of the Fatty Acid Industry.

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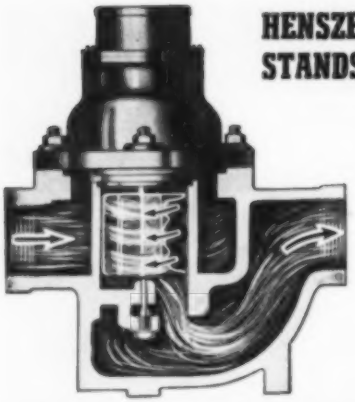


NEW BULLETINS

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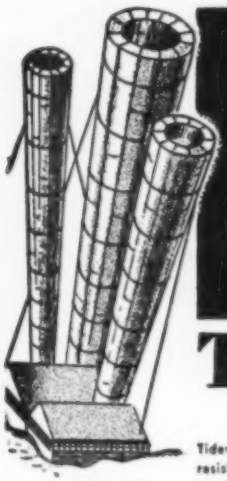
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should be made to determine if there be evidence of severe corrosion or deep pitting. The removal of the scale may uncover actual perforations in the tubes, which are plugged with scale. In the course of normal service, any portion of the tubes becomes plugged completely. If such be the case, the equipment must be opened and the tubes unplugged prior to in-place cleaning. Otherwise, the solution will be unable to contact the fouling material, and the equipment will not be thoroughly cleaned.

When the various in-place methods prove to be inadequate, resort must be made to the mechanical methods: lancing with air, steam or water; drilling or "rodding" the obstructive material from the tubes; sand blasting.

All of the above methods require that the exchanger be at least partially dismantled for cleaning, as distinct from the in-place methods, where any dismantling is only for inspection purposes.

Selection of the method depends on the nature of the fouling material. It should be noted that it is decidedly advantageous to steam both the tube and shell sides for as long as time will permit, prior to mechanical cleaning. This steaming removes the tarry or oily components of the fouling material, thus increasing the effectiveness of a given cleaning method.

P. F. Dougherty and C. H. Brooks, Sun Oil Co., before American Society of Mechanical Engineers, New York, Nov. 29, 1948.

SAFETY

. . . *Monoxide From Burning Paint*

M. W. Westgate

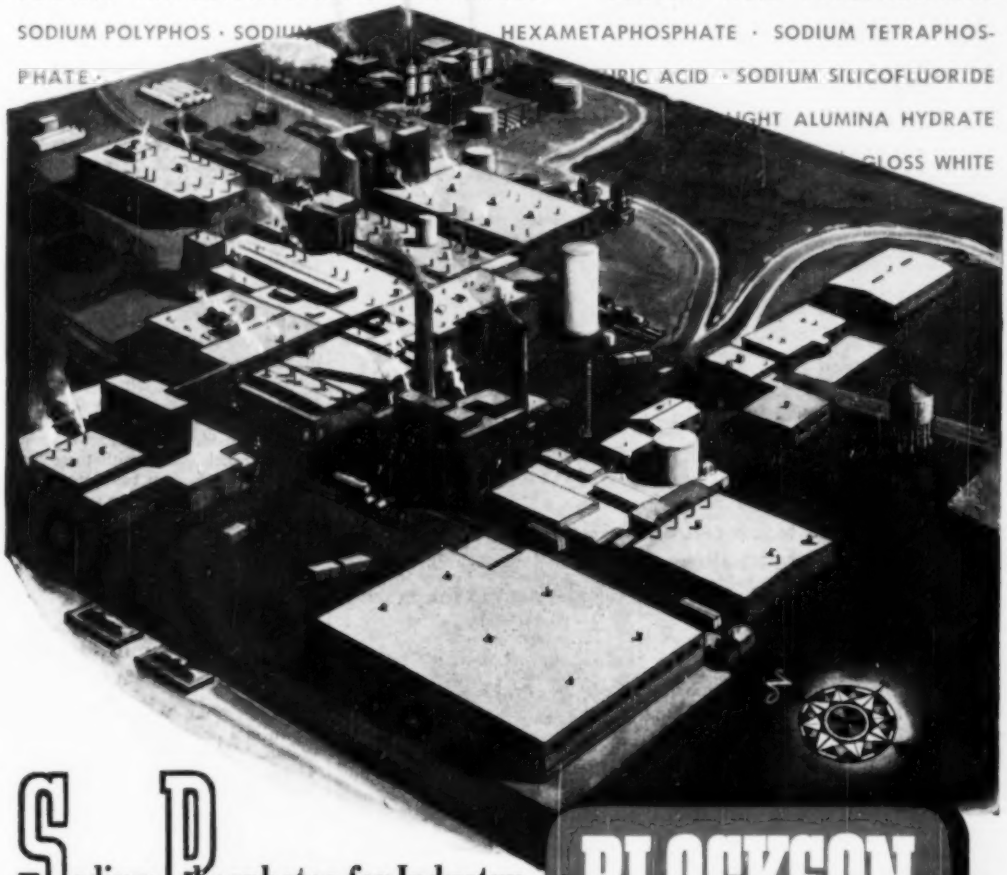
An exhaustive study of the behavior of painted surfaces during fires was undertaken by the National Paint, Varnish and Lacquer Association in response to wide public concern aroused by catastrophes such as the Winecoff, LaSalle, and other hotel fires.

The amounts of carbon monoxide and other gases coming from smoldering paints are insignificant compared with the much greater contribution of carbon monoxide from burning structures and other materials fed on by fires. For all practical purposes paint gases can be ignored when estimating the relative toxic hazards of all possible materials that might become decomposed in an actual building fire.

In addition, the presence in a fire of furnishing materials commonly found

(Continued)

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CHLORINATED TRISODIUM PHOSPHATE · DISODIUM PHOSPHATE CRYSTALLINE
DISODIUM PHOSPHATE ANHYDROUS · MONOSODIUM PHOSPHATE MONOHYDRATE
MONOSODIUM PHOSPHATE ANHYDROUS · TETRASODIUM PYROPHOSPHATE ANHYDROUS
SODIUM TRIPOLYPHOSPHATE ANHYDROUS · SODIUM ACID PYROPHOSPHATE
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Due to streamlining of design and integration of construction.



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in living quarters can give rise to high concentrations of various other toxic gases, such as hydrogen cyanide, oxides of nitrogen, ammonia, hydrogen sulphide, and sulphor dioxide.

It has been anticipated that heavily pigmented films, such as are to be found in interior flat wall paints, would probably have relatively lower rates of carbon monoxide production than combustible structural material. Not only was this proved to be a correct assumption, but it held true for all pigmented paint films, both oil-based and water-thinned, and to a lesser extent for clear films such as varnish. Not only did these protective coatings give off less carbon monoxide, weight for weight, but some of them actually reduced the total output for their combustible substrates. This shielding effect had not been anticipated, but it showed up markedly, particularly in some of the water-thinned paints.

A closely related investigation having to do with fire-retardent paints prompted the inclusion of two samples to represent both the water-thinned and oil-based types. Less carbon monoxide was formed from wooden panels coated with these fire-retardant paints than from any other type of paint in their respective classes.

Mark W. Westgate, National Paint, Varnish and Laquer Association, before Division of Paint, Varnish and Plastics Chemistry, American Chemical Society, San Francisco, March 30, 1949.

FERTILIZER

. . . *Western Production*

Ivan Bloch

Fertilizer use in the West has grown in a phenomenal manner. For example, 1946 consumption in 11 western states was seven times the 1930 level and double that of 1943. Yet, in 1944, although the 11 western states produced 17 percent of the national cash value of crops, they consumed only 5.5 percent of the fertilizer.

Phosphate plant food (P_2O_5) consumed in the 17 western states in 1946 was about 200,000 tons or five times the 1935-39 average. Slightly over 100,000 tons of nitrogen plant food was used in 1946, or four times the average for 1935-39. The same general trends are observable for potash.

What about the next few years? Exhaustive studies of potential markets for the 17 western states indicate a potential consumption of 700,000-900,000 tons of P_2O_5 by 1960 or 3.5-4.5 times the 1946 consumption. Quite probably the nitrogen and

potassium markets will follow these increases closely. Impressive as these estimates may be, they are conservative and they can and will be matched by western production.

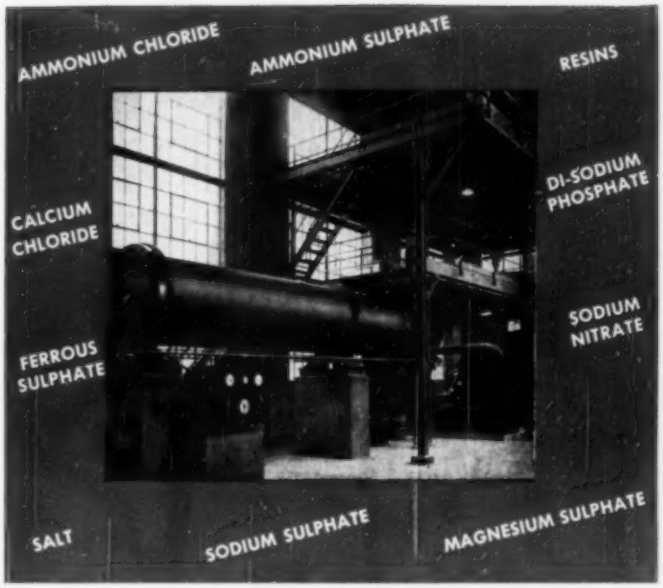
Some 60 percent of the nation's phosphate reserves are in Montana, Idaho, Wyoming and Utah. This immense reserve contains some eight billion tons of material, better than 40 percent tricalcium phosphate. The New Mexico, California and Utah gross developed reserves of potash have been estimated at over 100 million tons, with recoverable reserves of 73 million tons. To be added to these are other proved reserves, soluble and insoluble, which reach well over 100 billion tons. As to sulphur, the West has incalculable but more than substantial resources. Nitrogen, primarily in the form of ammonium sulphate and anhydrous ammonia, is potentially available in adequate quantities. In this respect, the availability of low cost hydroelectric power will be one of the principal springboards for that portion of the industry. Although power is at present critically short, potentials amount to huge figures and are conservatively estimated in the Pacific Northwest at 25 million kilowatts.

A glance at the map showing the location of phosphate fertilizer plants in 1945-46 reveals over 90 percent of the plants manufacturing ordinary superphosphates to be east of the Mississippi. For phosphate materials alone in 1946, the West's production capacity was some 130,000 tons of contained P_2O_5, as against an estimated consumption of 200,000 tons or a deficit on the order of 70,000 tons. The recognition of deficiencies in western production capacities is reflected by considerable activity on the part of industrialists, investment groups and farm cooperatives. A few new plants have been built and others are building or contemplated.

In general, for any industrial enterprise at any location, there must be a balance between production, transportation costs and the size of markets. Production costs in the West for basic fertilizer materials would be somewhat higher than in the East and Southeast if it were not for the low price of electric energy.

Transportation costs must be carefully considered. Even under present freight rate structures, highly concentrated fertilizer material made in the West is able to reach the entire 17 western states and some midwestern states. However, favorable adjustments in freight rate structures will assure this market. The stress on "concentration" is due to the fact

(Continued)



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Progress through Chemistry

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that consumers of ordinary low concentration fertilizer materials pay the freight on bulk material which adds nothing to soil fertility. The emphasis, therefore, of sound western fertilizer production will be toward concentrated materials which can be mixed at distant consuming points.

There is another factor which is beginning to assume practical aspects. This is the application of highly concentrated material in a direct manner rather than a diluted form. The urgency of increasing economic efficiency of farm operations should and must create further attention to this new and modern method.

Ivan Bloch, industrial consultant, before Western States' Chemurgic Clinic, Seattle, Dec. 8 1948.

SUBMERGED BURNERS

. . . *Molasses From Oranges*

E. M. Burdick, C. O. Anderson & W. E. Duncan

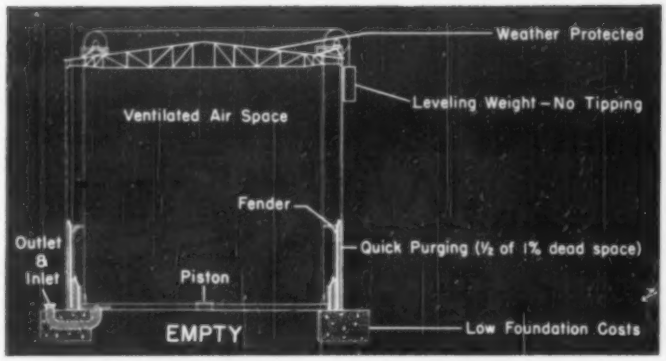
Flames burning under water are now used to turn orange juice wastes into high-grade molasses.

Orange wastes—nearly 3,000,000,000 lb. a year from making juice, sections, etc.—tend to "stick to the pan" like soup does when they are boiled in the ordinary way. This slows down the heating and the "soup" may scorch. With a new submerged burner however, the fire is right in the liquid and there is nothing for it to stick to. The boiling stirs the liquid so well that it does not have time to scorch.

Nearly one and a half million tons of waste materials will have to be disposed of, from this season's manufacturing of orange juice and other citrus products. In modern installations, these wastes go to dehydration plants where they are separated into a pulp portion and a liquid called "press liquor." The pulp portion is dried for use as stock feed, while the "press liquor"—about 20 percent of the total waste—is converted into a high grade citrus molasses.

Submerged combustion has several interesting features. For example, under submerged combustion conditions, water boils at about 190 deg. F. Instead of the normal 30,000 to 50,000 Btu. per cu. ft. per hr. of heat liberated in the firebox of an ordinary furnace, submerged burners will deliver 4,000,000 to 5,000,000. This makes smaller equipment practical and makes it possible to use expensive, corrosion resistant materials for it, since only small amounts are needed. These features help keep first cost and upkeep down for citrus products and

(Continued)



WIGGINS GASHOLDER

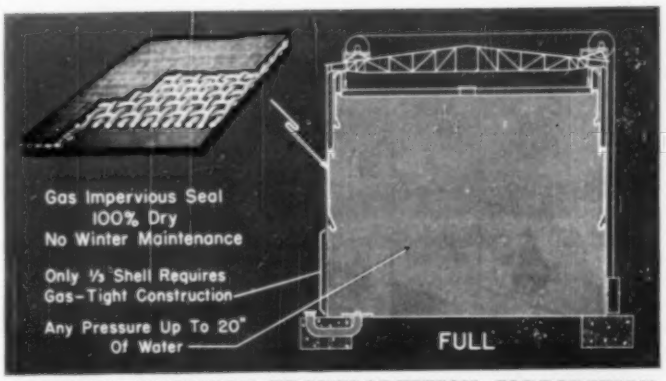
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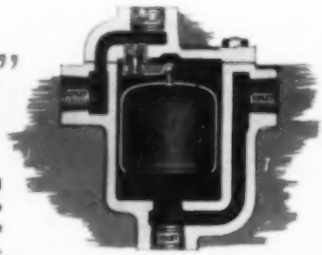
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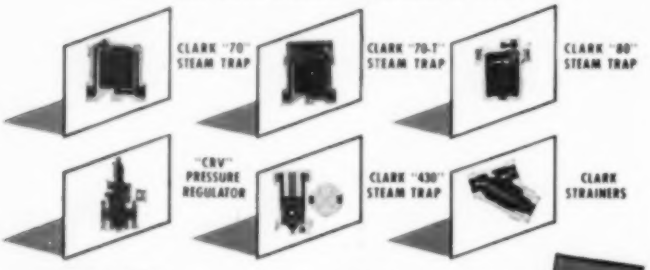
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lower plant costs are ultimately reflected in lower prices to the consumer. Actual plant experience since 1935 has proved these statements.

Submerged burners have been applied in treating a variety of sodium and potassium salt solutions and slurries in the potash industry, concentrating magnesium chloride solutions and phosphoric acid solutions. Still other uses are in recarbonating and in heating high-boiling point or high-melting-point liquids. Citrus waste used to be disked into the ground as a fertilizer, or the pulp was fed directly to cattle. Drying the waste first, however, was found to be cheaper and better. Early drying methods produced a scorched product, so a method was sought to get away from the burning. The modern process includes grinding, liming, mixing, curing, draining, drying, and bagging. The draining step, often helped along by pressing, gets rid of much of the liquid in the waste. Until a few years ago this liquid portion was thrown away. It made a serious disposal problem, however, and it contained quite a bit of valuable sugars. Means were sought, therefore, of recovering, concentrating, and using the liquor. That is where submerged-combustion came into the citrus picture.

Experience at the Texsun plant with submerged combustion for concentrating press liquor was highly favorable. Not only were scaling and scorching effectively eliminated, but the submerged combustion pasteurized the liquor and precipitated calcium citrate and calcium pectate so that they would cause no trouble in later operations.

E. M. Burdick, Texsun Citrus Exchange, C. O. Anderson and W. E. Duncan, Ozark-Mahoning Co., before American Institute of Chemical Engineers, Los Angeles, March 7, 1949.

RUBBER

. . . Cold Rubber Review

G. H. Swart

"Cold" rubber is the first real commercial threat to natural rubber.

This product is a real commercial threat to natural rubber because it gives promise of automobile tires superior to those now made from the natural product. The tire industry is the greatest user of natural rubber in the world.

Although much of the basic work in cold rubber was done before 1947, the first plant scale runs of low temperature rubber were made during the summer of 1947. The subsequent authorization by the Office of Rubber

(Continued)

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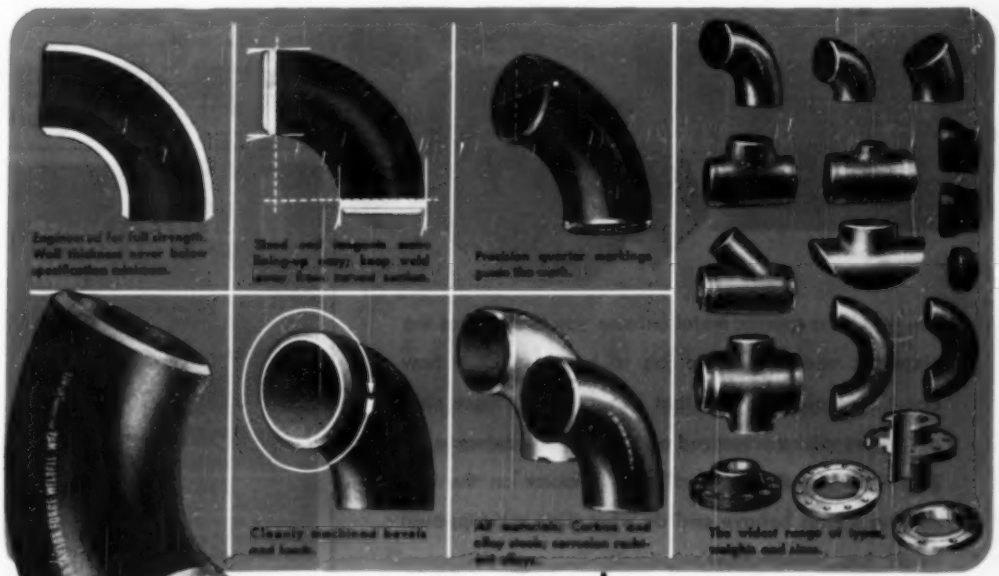
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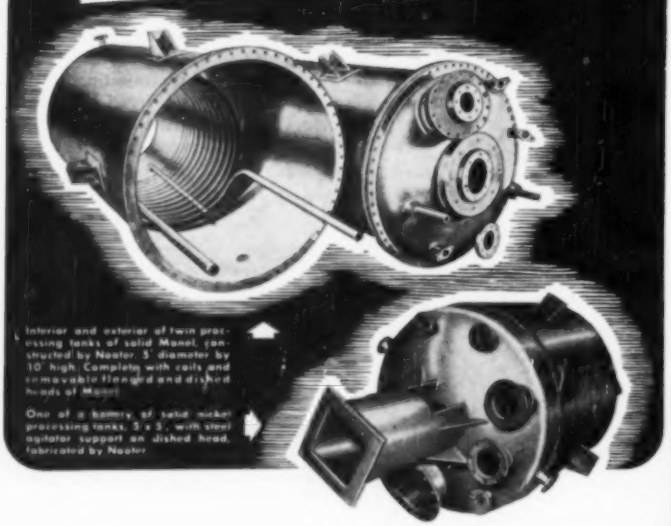
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CONVENTION PAPERS, cont. . .

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Cold rubber is essentially the same as standard GR-S, except that the polymerization of the reactants, butadiene and styrene, is conducted at 41 deg. F. instead of the usual 122 deg. F.

Thus the only basic plant change needed for conversion is the installation of adequate refrigeration equipment. The chief technological problems in the conversion to cold rubber were the proper selection of catalysts that would permit polymerization to proceed at lower temperatures and effective means of stopping the reaction when completed. The improvement in properties obtained by low temperature polymerization is largely attributed to more regularity of the molecular chains and less branching under such conditions.

G. H. Swart, L. W. Brock and Ed Osberg, General Tire & Rubber Co., before American Society of Mechanical Engineers, New York, Nov. 30, 1948.

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You can get immediate deliveries on both Eastern GW Series Pumps. They are supplied with 1/6 or 1/4 H.P. motors; belt driven or flexible coupling driven units are also available.

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FOREIGN LITERATURE ABSTRACTS

Soviet Sulphuric Acid Industry

Sulphuric acid production was not a very important industry in prerevolutionary Russia; most of the raw material was imported, and tsarist Russia occupied 13th place in the world's sulphuric acid output. More than 50 percent of all the acid produced in Russia was contact acid. Production dropped severely the first few years after the revolution but it rose from 17,000 tons in 1919 to 200,000 in 1928. A really large sulphuric acid industry was developed during the first and second 5-year plans, and by the end of the second 5-year plan Soviet Russia occupied 4th place in the world for sulphuric acid production. By 1935 a number of tower plants had attained a production rate of 28-37 kg. per cu. m. per day, and many plants finally reached a rate of 200-250 kg. per cu. m. A great many improvements have also been introduced in the contact process and the capacity of contact equipment has increased five times. Detailed investigations have been conducted in recent years at the Scientific Institute of Fertilizers and Insecticides and Fungicides on the theory of contact oxidation of sulphurous anhydride, kinetics of oxidation on a vanadium catalyst, methods of calculation, development of new contact apparatus, application of oxygen in contact production and many other problems. Work on corrosion and other questions has been done at institutes and universities too. Experiments have been conducted on a semi-industrial scale by a number of these organizations to develop methods for SO_2 concentration in waste gases from metallurgical furnaces and similar sources.

Digest from "Technology of Fertilizers and Sulphuric Acid in the USSR in a 30-Year Period" by S. I. Volfkovitch and A. M. Dubovitskii, *Zhurnal Prikladnoi Khimii* **XX**, No. 11, 1053-1082, 1947. (Published in Russia.)

Brazilian Petroleum

There were three regularly operating petroleum refineries in Brazil in 1946: Destilaria Riograndense de Petroleo S. A. in Uruguaiana; Ipiranga S. A. Companhia Brasileira de Pet-

(Continued)

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STRONG — Made of reinforced stainless steel throughout, with hexagonal Stainless Steel Screw Plug for easy opening and sealing.

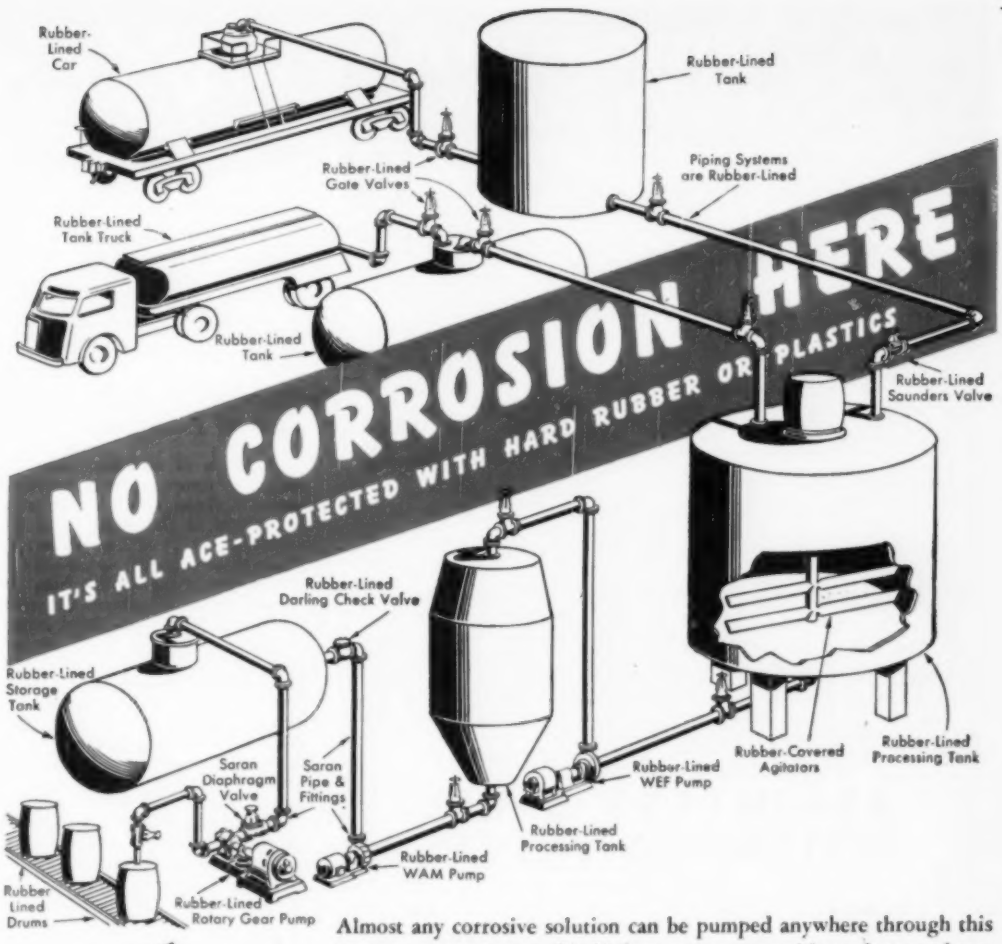
COMPACT — 12" diameter x 22" high, requires 60% less storage space than ordinary carboy.

LIGHT — Weighs only 19 lbs., yet holds nearly 100 lbs. of fluid. Can be handled by one man, reducing labor cost.

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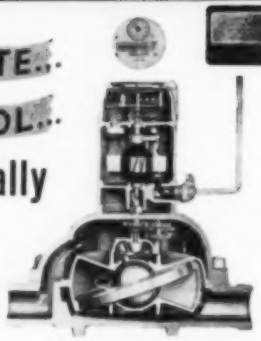
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roleo in Rio Grande, and Industrias Matarazzo de Energia S. A. in Sao Paulo. Their total production for 1946 was as follows:

Ordinary gasoline, liters	20,208,361
Kerosene, liters	8,638,365
Diesel oil, kilos	8,804,177
Fuel oil, kilos	13,577,898
Lubricating oil, liters	459,198
Ultra-oil, kilos	1,389,045
Gas oil, kilos	2,876,228
Solvents, liters	708,447
Raw material for solvents, liters	2,018,850
Raw material for lubricants, liters	269,797
Super solvent, kilos	2,811,800

Digest from "Production of National Refineries" *Relatorio de 1946*, Conselho Nacional do Petroleo, p. 56-61, 1948. (Published in Brazil.)

Electrodialysis for Alkaloid Extraction

Extraction of alkaloids, glucosides and similar compounds from vegetable raw material consists of several phases: penetration of the solvent into the vegetable fiber, 2) solution of the substance to be extracted in the solvent, 3) diffusion of the solution from the tissue. Choice of solvents is particularly important in industrial extraction and the following solvents are used for this purpose: water in the presence of acids, alcohol, ethyl ether, petroleum ether, chloroform, benzene, kerosene, a mixture of solvents (such as chloroform with alcohol) and many others. The products of extraction have to be purified by a series of treatments, including dialysis, which is particularly time-consuming (sometimes lasting for weeks and even months). A number of dialyzators were therefore designed to accelerate dialysis and reduce the quantity of solvent required. The physical and chemical properties of alkaloids indicated that they could be extracted successfully on the cathode with electrodialysis, and experimental work proved that this process was much faster than other methods of extraction from vegetable raw material. Electrodialysis is a very promising method for industrial extraction of alkaloids.

Digest from "Electrodialysis as a Method for Extracting Alkaloids from Vegetable Raw Material and Other Substances" by S. Kh. Babich, *Zhurnal Prikladnoi Khimii* XX, No. 7, p. 652-659, 1947. (Published in Russia.)

Metal Situation in Germany

Like most of Europe, Germany has exhausted its own ore deposits to such an extent that it has to depend on imported raw material for metallurgical purposes. The attached tables show the quantities of aluminum, lead, copper, zinc and tin produced and consumed in Germany from 1913

(Continued)

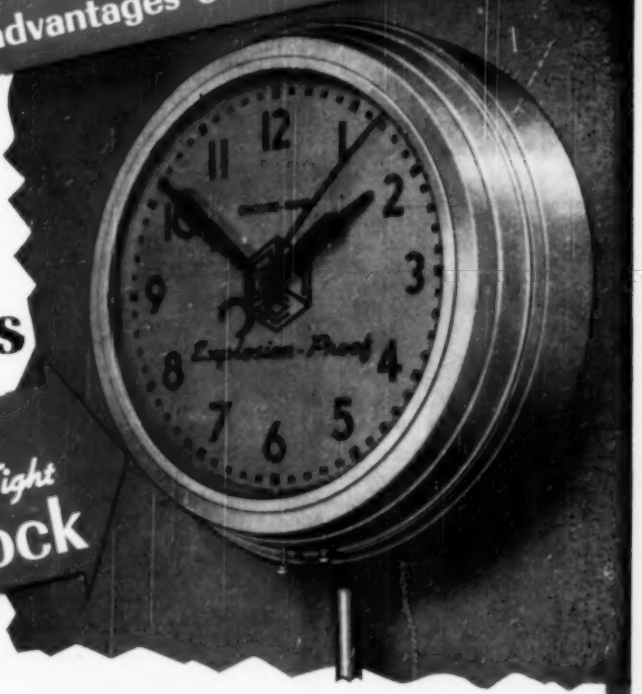
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Explosion-Proof and Dust-Tight

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Safety. Crouse-Hinds Electric Clock is safe to use in locations where explosive atmospheres are likely to be present.

Easy to read. This large electric clock has a dial 13 inches in diameter scientifically designed for easy reading. The face is satin finish aluminum with numerals, hour and minute hands in jet black, and a sweep second hand in brilliant red.

Attractive case. Finished in metallic gray enamel.

Easy to maintain. Can be taken apart in a jiffy .... without special tools. Can be reset without opening the case.

Small housing. The motor and all electrical connections are enclosed in an explosion-proof CONDULET* housing only 5-3/4 inches in diameter.

Two styles. The clock is furnished in two styles One is for flush mounting where concealed conduit is used. The minimum depth required for the CONDULET in the wall is 3-1/2 inches. The other style is for surface mounting where the conduit is on the surface of the wall. Either style can be flush mounted on a panel.

Adjustable. The CONDULET body can be mounted for either vertical or horizontal conduit connection.

Listings on new Page 12J, Section 85, CONDULET Catalog 2500.

Crouse-Hinds complete line of thousands of CONDULETS includes a cast outlet for every purpose in ordinary and hazardous locations.

**CONDULET is a coined word registered in the U. S. Patent Office. It designates a product made only by the Crouse-Hinds Company.*

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Fig. F-80

STAINLESS STEEL:

Available in capacities from .57 G.P.H. Fig. F-80 style illustrated, to 104 G.P.M. (Fig. B-8-A style).
"Hollow" cone, "Solid" cone, and "Flat" sprays furnished in pipe sizes and capacities to suit practically any problem where corrosive liquids are sprayed.

STONEWARE:

Monarch Fig. 6020 and Fig. 6040 stoneware sprays have replaced most other types of nozzles used in acid chamber plants throughout the world. Last almost indefinitely in sulfur gases and will not break or crack from temperature changes.

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Patented Fig. B-27 nozzle is of the "non-clog" type, i.e. it contains no internal vanes, slots, or deflectors which might facilitate clogging. Available ¼" to 1" pipe. Small sizes produce a very fine, soft, wide angle hollow cone spray, even at low pressures.
Fig. H-407 "flat" spray produces a relatively fine even sheet of liquid.

Write for Catalogs 6A and 6C

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Metals Produced and Consumed in Germany

In Tons	1913 Production	1913 Consumption	1929 Production	1929 Consumption	1937 Production	1937 Consumption
Aluminum	5,000	13,600	33,300	32,600	127,600	128,600
Lead	172,700	215,100	110,300	217,400	166,400	230,600
Copper	41,500	259,700	53,600	216,400	65,400	228,100
Zinc	281,100	232,000	102,000	200,300	163,300	233,800
Tin	12,000	19,900	4,000	16,400	7,700	17,500

Ratio of German Metal Consumption to That of the World

In Tons	1929	1936	1937	1938
Aluminum				
World consumption	259,600	397,500	499,600	515,100
German consumption	32,600	102,300	128,600	176,600
Percent of world	12.1	25.7	25.7	34.3
Lead				
World consumption	1,708,100	1,586,700	1,732,400	1,607,300
German consumption	217,400	205,900	230,600	260,900
Percent of world	12.7	13.0	13.3	16.2
Copper				
World consumption	1,761,100	1,787,200	2,069,100	1,912,400
German consumption	216,400	185,800	228,100	366,000
Percent of world	12.3	10.4	11.0	19.1
Zinc				
World consumption	1,442,200	1,514,900	1,605,600	1,426,700
German consumption	200,200	209,600	233,800	269,400
Percent of world	13.9	13.8	14.6	18.9
Tin				
World consumption	184,300	174,600	192,500	164,600
German consumption	16,400	16,000	17,500	20,200
Percent of world	8.9	9.2	9.1	12.3

through 1937; the ratio of German metal consumption to that of the world; and the production, consumption and importation of crude metals into Germany in 1938.

Production, Consumption and Imports of Crude Metals in Germany in 1938

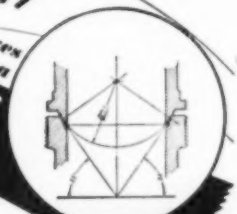
In Tons	Consumption	Production	Importation
Aluminum	176,600	165,600	14,480
Lead	280,900	185,200	84,400
Copper	306,000	68,800	298,600
Zinc	269,400	194,400	81,900
Tin	20,200	7,900	12,900

—*End*

Digest from "Dependence of Germany on World Economy in the Metal Situation," *Metall* **19/20**, p. 347-348, 1948. (Published in Germany.)

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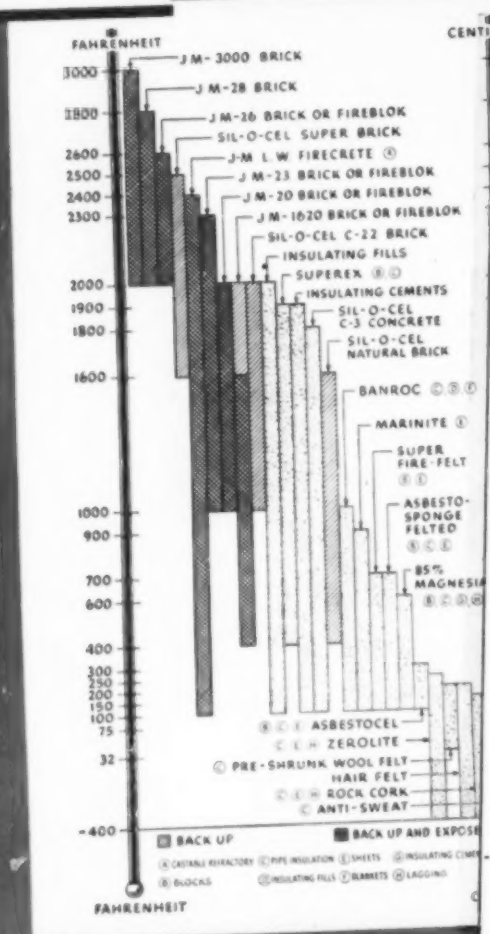


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Chemical Engineer's Bookshelf

LESTER B. POPE, *Assistant Editor*

Delayed Detonation

NO PLACE TO HIDE. By David Bradley. Little Brown & Co., in association with the Atlantic Monthly Press, Boston. 182 pages. $2.

Reviewed by S. D. Kirkpatrick



Able Day at Bikini was July 1, 1946. Baker Day, when the underwater bomb was detonated, was July 25, 1946. Twenty-eight months later, on Nov. 23, 1948, Dr. Bradley published his day-by-day diary of his experiences as one of the radiological monitors at the Bikini tests. Almost immediately it became a bestseller, a very popular selection of one of the largest book clubs. Why? It is far from thrilling and must have been dull reading for the lay ladies and gentlemen I have seen poring over it on the trains and in libraries. There is practically nothing new in it for the technical man who has studied the mountains of articles, pamphlets and books on the bomb and its frightful byproducts.

But all this sounds like—and is—"sour grapes." A large proportion of the 42,000 of us who went to Bikini kept diaries of one kind or another. Some of us secretly hoped they might be worthy of publication and more or less permanent preservation. But most of us found on our return to these shores that Bikini diaries were a dime a dozen. Even those of us who were editors hesitated to force too much of our own observations on our unsuspecting readers (nevertheless, see *Chem. Eng.*, July, p. 101; Aug., pp. 93-96, 125-126; Sept., pp. 106-108, 1946).

Should we have waited as did Dr. Bradley? The answer is "No" for there are qualities in this little book quite different from ours—qualities that make it worthy of the abundant praise that has been heaped upon it. Obviously it was not a slapstick job, hastily thrown together as were most of our on-the-spot reportings. Its sentences shine with luster that comes only with careful polishing of words and phrases. Its inherent modesty and sincerity lead you on and on according to what must have been a well-laid plan—or plot. The result is that when you come to this little book's conclusion, you have been sold a bill of goods. You may not want to admit it, but you have been and are badly scared—and not always by what you have read in its 180 pages. It has made you think for yourself of what this world is coming to if we don't master the monster that all of us have helped release and for whom there is yet "No Place To Hide."

Fritz Ephraim

INORGANIC CHEMISTRY. Fifth edition. Edited by P. C. L. Thorne and E. R. Roberts. Interscience Publishers, New York, 939 pages. $8.75.

Reviewed by Kenneth A. Kobe

In 1926, Dr. Thorne translated into English the current German edition of Fritz Ephraim's "Inorganic Chemistry." Since that time considerable revision of the book has been made by the English authors and the present edition may be considered as their text which follows the general scheme of Ephraim.

The general scheme is to present the mass of information on inorganic compounds by generalizing it to fit with various groups. To accomplish this the book is divided into six sections: elements; halogen compounds; oxides of hydrogen and metals; compounds of sulphur, selenium and tellurium; the nitrogen, phosphorus, arsenic group; the elements of the fourth group and boron.

First section on the elements discusses the structure of matter and theories of valence. Nuclear disintegration is only three pages in the chapter on radioactivity and the transuranium elements are barely mentioned. It would appear that this modern and important phase of inorganic chemistry would merit more attention.

This book will give a fine background in the general descriptive relationships of inorganic chemistry. Few specific data are given and none of the physical chemical data characteristic of Yost and Russell's book. This book can be recommended as a textbook or reference text to achieve background before specific information is sought in other sources.

Despite their shortages the British printers have done a fine job of bookmaking with good paper and ample margins. Interscience Publishers are to be congratulated on making this book available at a low price considering the size of the book.

How Much Water?

AQUAMETRY. By John Mitchell, Jr., and Donald M. Smith. Interscience Publishers, New York. 444 pages. $8.

Reviewed by M. E. Auerbach

The authors propose the term "Aquametry" as a generic word including not only the determination of pre-formed water, but also of water liberated or consumed in organic reactions deliberately employed for analytical purposes. Until lately, probably few analysts have made use of the obvious truth that water is a stoichiometric end product of—for example—the esterification of carboxylic acids. Given the proper conditions for quantitative esterification and a highly selective reagent for water (i.e. the Karl Fischer reagent), then the quantitative estimation of water clearly becomes a means for estimating both carboxy and alcoholic hydroxy groups. This is an example of the new analytical vistas opened by the authors, and based, to an impressive extent, on their own work.

Aside from a 17-page review of other methods, both physical and chemical, for determining water, the book is a treatise on the use and limitations of the Karl Fischer reagent containing iodine, sulphur dioxide

(*Continued*)

RECENT BOOKS RECEIVED

The Coming Age of Wood. By E. Glesinger. Simon and Schuster. $3.50.

Economics of Industrial Management. By W. Rautenstrauch & Raymond Villers. Funk & Wagnalls. $5.

Elastomers and Plastomers. By R. Houwink. Elsevier. $4.50.

Odors—Physiology and Control. By C. P. McCord & W. N. Witheridge. McGraw-Hill. $6.50.

Patent Law. 2nd ed. By C. H. Biesterfeld. Wiley. $4.



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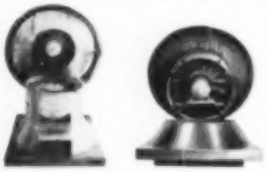
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and pyridine. It is divided into two parts. In the first is included a study of the nature of the Karl Fischer reagent and the chemistry of its reactions and side reactions; studies on modifications of the reagent; detailed descriptions of titration equipment and procedures for both visual and electrometric, macro and micro analyses; a detailed review and examples of the assay of water in very many classes of organic compounds, in food-stuffs, oils, explosives, and numerous other technical materials.

Part two of the book, comprising 134 pages, has to do with the application of the Karl Fischer reagent to the quantitative determination of organic functional groups through organic reactions involving the liberation or consumption of water. These groups include hydroxy, carboxy, anhydride, carbonyl, amine, nitrile, peroxide, and others. Having in mind future needs of the technical analyst, the reviewer believes this to be the most engaging and important part of a book packed with valuable information. Control laboratories are likely to continue to use oven drying and other time-proved methods for many purposes. But already, as happens with every important new tool, it is hard to see how we ever got along without the Karl Fischer method. Mitchell and Smith have provided an authoritative handbook on the many ramifications of the method.

Safety First

INDUSTRIAL HYGIENE AND TOXICOLOGY, Vol. I. Edited by Frank A. Patty. Interscience Publishers, New York. 531 pages. $10.

Reviewed by Morris B. Jacobs

This book's purpose is to present the subject of industrial hygiene and toxicology in understandable terms and in sufficient detail to be of use to all persons interested in safeguarding the health and welfare of working people and in improving their working environment. This is a subject of immediate importance to the chemical engineer for safeguarding the health of workers through control of the working atmosphere and environment leads to better working conditions and hence to a better product at actually lower cost.

Each topic (industrial hygiene records, reports, surveys, and personnel; personal and environmental factors in competence and fatigue; physiological effects of abnormal atmospheric pressure; mode of entry and action of toxic materials; radiant energy and radium; ventilation; occupational dermatoses; visible marks of occupational diseases; fire and explosion hazards of gases, vapors, and dusts; respirators and respiratory protective devices; and dust and its role in the causation of occupational diseases) is covered by an expert in the field. The book contains many valuable tables such as volumes of air exhaust required for dust-producing equipment, limits of flammability of gases and vapors in air, common external marks of occupational diseases and the like.

The stress in industrial hygiene work has changed from inquiry into causes of ill health to interest in anticipating and avoiding harmful situations before they have time to cause injury. This book should serve this objective adequately.

The book has a little larger page size than usual (6¾x9¾); it is well set up; there has been evident care in proofreading; and it is competently illustrated. The chemical engineer and the chemist will find it of value for those aspects of his work related to industrial hygiene.

Quant

CALCULATIONS OF QUANTITATIVE ANALYSIS. By Philip W. West. The Macmillan Co., New York. 162 pages. $2.75.

Reviewed by Edwin W. Blase

Written as a text, this book presents the mathematical concepts of the first course in quantitative analysis. The instructor who prefers to devote most of the lecture time to the chemical theories applied to quantitative analysis will find this book useful in presenting the methods of calculation. The book is carefully organized and clearly written. Many examples and 360 problems are presented. Many problems have a direct bearing on industrial applications. Of particular interest is a chapter devoted to the elementary laws of statistical analysis as applied to chemical data.

This text appears to have been written to satisfy a particular need, that is, the presentation of the mathematical concepts of analytical chemistry.

Symposium

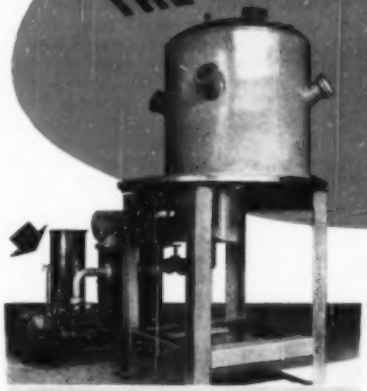
HIGH-POLYMER PHYSICS. Edited by Howard A. Robinson. Published under the auspices of the American Institute of Physics by Remsen Press, Chemical Publishing Co., Brooklyn, N. Y.

Reviewed by Turner Alfrey, Jr.

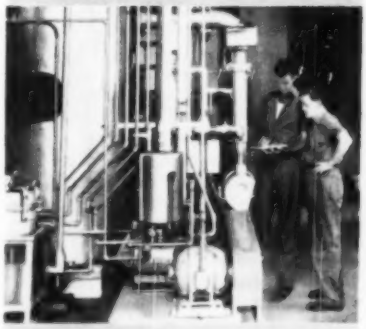
High Polymer Physics is a very useful collection of papers originally presented at a symposium held by the

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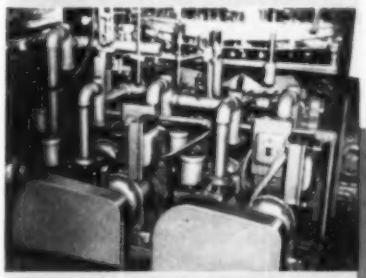
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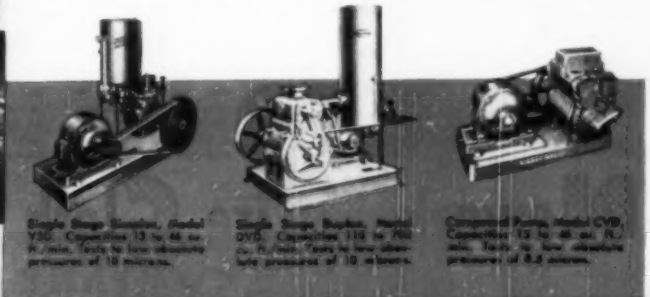
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high polymer division of the American Physical Society in January 1946. Most of these papers have already been published in available journals, a fact which ordinarily would detract markedly from the value of the collection in book form. In this case, however, a very satisfactory result has been achieved. The book does not give the impression of being a disjointed collection of research papers which happened to be presented at the same meeting. On the contrary, the book does not differ too much from what might be expected of a cooperative monograph with different authors writing the individual chapters. Many of the papers are of a review character.

The papers are classified under four headings: determination of the molecular structure of high polymers (3 papers), physical properties of high polymers (12 papers), chemical physics of high polymers (5 papers), and instrumentation and high polymers (3 papers). The individual papers are well done.

Altogether, this book deserves careful study by anyone who is interested in the application of physics to problems of high polymers.

Pre-Plugging the Gap

THE MARKETING OF CHEMICAL PRODUCTS. By Robert S. Aries and William Sopulsky. Overland Chemical Corp., Brooklyn. 149 pages. $5.

Reviewed by Roger Williams, Jr.

Bob Aries and Bill Copulsky have found a hole in the chemical literature and have made a real beginning on plugging it. The hole is the marketing and market research side of the chemical industry. The beginning at plugging the hole is a planographed, preliminary edition of "The Marketing of Chemical Products."

A run-down of the chapter headings will give an idea of the scope of the book. First comes a chapter on advertising of chemicals. The various media used and types of campaigns are shown by actual examples.

Next comes a chapter on selling chemicals. The various channels of distribution are given and sales division organization and sales promotion are discussed.

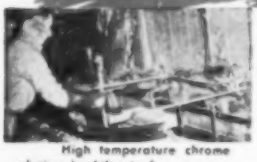
The third chapter is the major chapter in the book. It deals with market research, specifically as it is used in the chemical industry. Sources of data, forecasting chemical demand, obtaining data, and uses and content of the final report are among the subheadings.

Next is a discussion of another field neglected in the available litera-

(Continued)


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ture—technical service departments, or commercial development as such departments are sometimes called. The methods used by two companies are used as examples. Organization and functions of such departments, their role in pricing are discussed. There is also a section on price economics which covers break-even points and changes in the components of selling prices.

Finally there are two chapters covering the development of new products and markets and marketing chemicals directly to the consumer.

The book concludes with a 106-item bibliography, covering most of the material published on this subject in recent years.

Like most preliminary editions of what later will be a complete book, this issue has minor mistakes. But they do not detract from the basic value to men engaged in the marketing of chemicals or in chemical market research. Perhaps the only criticism possible is that the book is too short. It is hoped that the final edition in printed form will be considerably amplified and will put more emphasis on the economic side, the interrelationship between price, volume and profit. It appears this will be the case since the authors state in the introduction, "The present book is a preliminary version of one which will treat the broader aspects of chemical marketing and research and delve deeper into their practical applications in industry."

What of Tomorrow?

THE ECONOMICS OF INDUSTRIAL MANAGEMENT. By Walter Rautenstrauch and Raymond Villers. Funk & Wagnalls, New York. 451 pages. $5.

Reviewed by Robert S. Aries

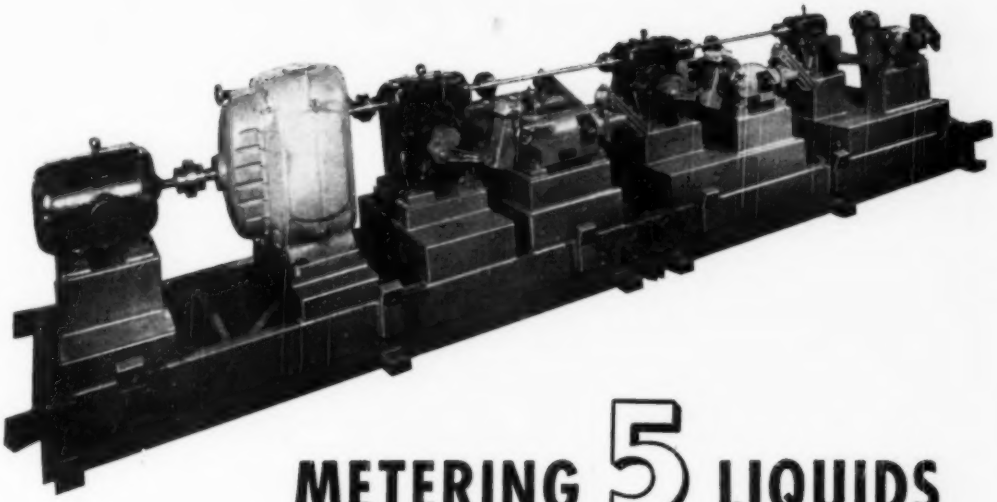
During the last seven "fat" years of the chemical process industries, a manager could have perhaps neglected with relative impunity the study of his sales-expense relationships, depreciation, relative worth of alternatives, and the allocation of expenses. But what of tomorrow? The new book by the pioneer of industrial engineering and his assistant could not have been more timely. In addition to a fundamental and interesting treatment of financial statements and their interpretation, basic calculations in the use of money, depreciation and unit costs, the authors have given us a wealth of pertinent economic yardsticks and thermometers.

The book represents a forward step in the application of break-even points

(Continued)

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in Exact Ratio to the Speed of the Process

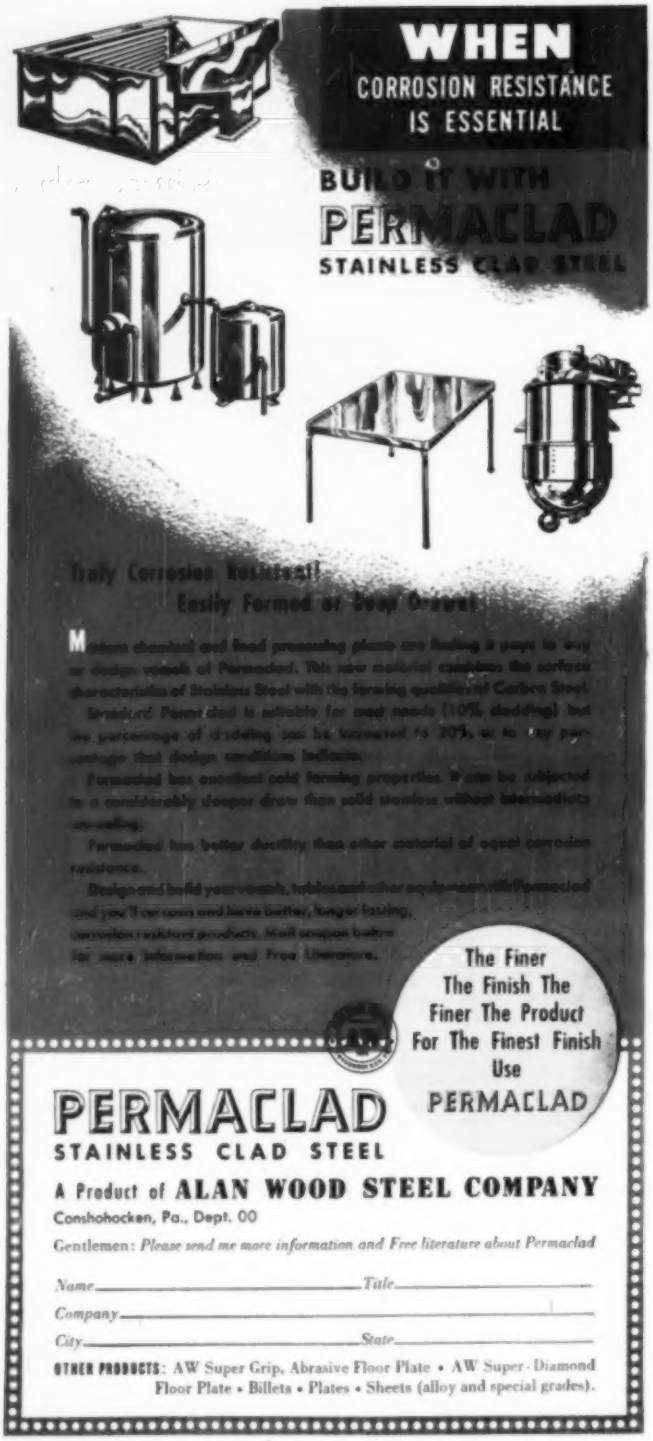
The above Milton Roy "gang" pump assembly meters the flow of five streams in a processing operation, gives the process positive, precise ratio control by means of Milton Roy controlled volume pumps . . . maintains product quality, lowers cost by preventing waste of high cost ingredients. It is completely automatic, the speed of the unit being controlled by means of a Thymotrol actuated by the flow of the process. It is extremely flexible, the quantity of liquid delivered by each pump cylinder being individually regulated by speed reducers plus micro stroke length adjustment while running, thus making it possible to change the ratio of any treating chemical while the entire system is in operation.

Any type of metered variable can be used to automatically regulate the quantity of liquids delivered by such a feed system. Units can be assembled to handle as many as ten streams.

Milton Roy Chemical Feed Systems are finding many applications, in many fields, for a wide range of treating purposes. We will be pleased to recommend such a system to meet your specific requirements.

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—the point at which earnings balance the expenses. As was pointed out recently (*Chem. Eng.*, Feb. 1949, p. 110), they have risen considerably and would be a real threat if prices or production should decline. More ominous is the fact that the average chemical manager does not know where his break-even point is. This book could be read profitably by him, as it goes into detail into the working of the charts for entire companies, departments and new products. The break-even point, originated by Prof. Rautenstrauch many years ago is a proved, yet little appreciated tool to management.

The last part of the book delves into such timely topics as the dollar as an economic yardstick, consequences of inflation, purchasing power and industrial expansion. It is gratifying that examples taken from the process industries are also used in the book.

Drs. Rautenstrauch & Villers have made a contribution to American industry and given us a volume which should be read profitably by both the chemical manager and student of industrial economics.

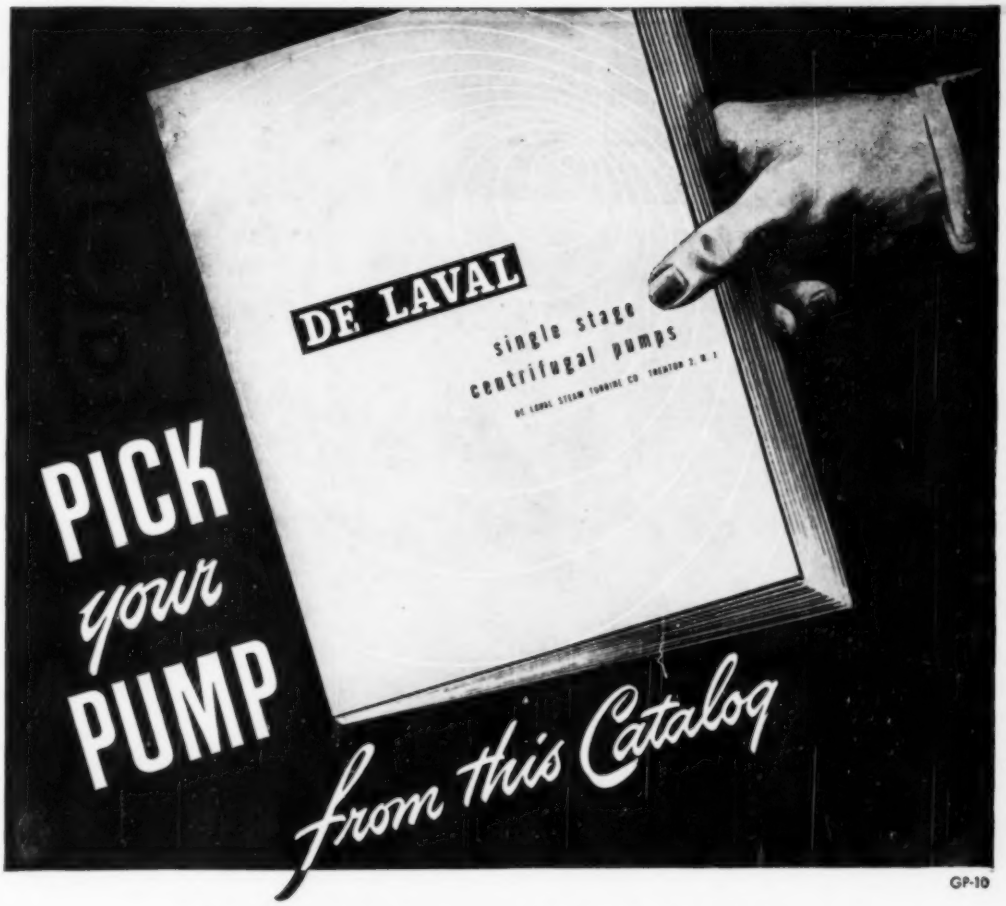
Rubber Reference

ENGINEERING WITH RUBBER. By Walter E. Burton. McGraw-Hill Book Co., New York. 486 pages. $6.50.

Reviewed by Donald F. Othmer

Materials of construction are among the most important of an engineer's considerations. No one material, certainly among the non-metals, appears in as many forms and with so many different physical characteristics, as does rubber. The present volume is the first attempt at a comprehensive coverage of the field of the uses of rubber in engineering and industry. Enough is given of the background of the compounding and methods of manufacture of the hundreds of rubber materials discussed to give the user knowledge of the possibilities and properties of each on which to base his specifications. Most of the book is, however, devoted to examples of the existing engineering uses of rubber materials with comments as to desirability and relative advantages as compared with each other and to other materials. Not all is qualitative description; there are some hundreds of excellent drawings showing rubber in its many services to engineers, their products, and plants. Numerous tables of properties, specifications, and dimensions have been compiled. In the chapter on V-belts and sheaves, for example,

(*Continued*)



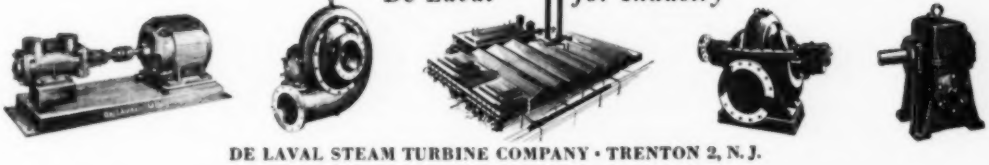
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there are the equivalent of over 27 pages of tables of numerical properties and data. This will be a handy reference book for almost every chemical and mechanical engineer.

Recent Books & Pamphlets

Who, Me? By Arthur O. England. Published by the National Foremen's Institute, Inc., Deep River, Conn. 24 pages. 25 cents. Calculated to help supervisors get better cooperation from workers.

British Chemicals and Their Manufacturers, 1949. Published by the Association of British Chemical Manufacturers, 166 Piccadilly, London, W. 1, England. 141 pages. Contains a list of manufacturers and their products which include all types of chemicals—heavy, fine, pure etc.

Bibliography of the Platinum Metals, 1931-1940. By James L. Howe and staff of Baker & Co. Published by Baker & Co., Newark, N. J. 248 pages. $5. This is the third in a series; the first two volumes covered 1748-1917 and 1918-1930. References where platinum is used merely as a routine material in the construction of apparatus have been omitted. In citing abstract journals, preference has been given to Engineering Abstracts and Chemisches Zentralblatt.

Careers in Engineering and Science. Published by Polytechnic Institute of Brooklyn, 99 Livingston St., Brooklyn, N. Y. 68 pages. Generously illustrated with photographs, this booklet is calculated to present a picture of a typical engineering college; its aim is to help a young man decide whether or not engineering would be a fit career for him.

New Products and Services, 1949. Published by Journal of Commerce, 63 Park Row, New York. 80 pages. 50 cents. Detailed description of the innovations of more than 750 different manufacturers, classified by industry and indexed by name and address of each producer.

The Chemical Production of Lactic Acid From Sugars. By Rex Montgomery. Scientific Report Series No. 11. Sugar Research Foundation, Inc., 52 Wall St., New York. 28 pages. Reviews latest work on production of relatively high-purity lactic acid in large quantities at relatively low cost.

A.S.T.M. Specifications for Steel Piping Materials. Published by the American Society for Testing Materials, 1916 Race St., Philadelphia, Pa. 319 pages. $3. Up-to-date compilation of ASTM specification on pipe, castings, boltings, flanges, etc.

Forests, Agriculture and Minerals. Vol. 2, Industrial Resources of Tennessee, revised edition—1948, published by Tennessee State Planning Commission, 432 Sixth Ave., North, Nashville, Tenn. 100 pages. $1.

Water Supplies, Fuels, Electric Power and Transportation Facilities. Vol. 3, Industrial Resources of Tennessee, revised edition—1948, published by Tennessee State Planning Commision, 432 Sixth Ave., North, Nashville, Tenn. 59 pages. $1.

Industrial Regulation Taxes and Licenses. Vol. 5, Industrial Resources of Tennessee, revised edition—1948, published by Tennessee State Planning Commission, 432 Sixth Ave., North, Nashville, Tenn. 59 pages. 50 cents.

Mortar Bond Characteristics of Various Brick. By H. R. Forkner, R. S. Hagerman, P. S. Dear, J. W. Whittemore. Engineering Experiment Station Series No. 70, published by Virginia Polytechnic Institute, Blacksburg, Va. 53 pages. 25 cents. Discusses materials used, methods of tests, analysis of data.

Salt Report for the B & O Area. Published by the Baltimore and Ohio Railroad Co., 25 Broadway, New York. 56 pages. Rock salt in New York, Pennsylvania, Ohio and West Virginia. Brines in Ohio and West Virginia.

—*End.*



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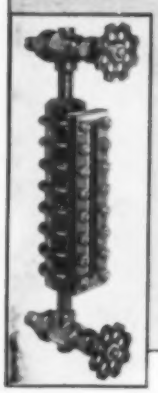
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GOVERNMENT PUBLICATIONS

The following recently issued documents are available at prices indicated from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. In ordering any publications noted in this list always give complete title and the issuing office. Remittance should be made by postal money order, coupons, or check. Do not send postage stamps. All publications are in paper cover unless otherwise specified. When no price is indicated, the pamphlet is free and should be ordered from the bureau responsible for its issue.

Mineral Statistics. Two series of Bureau of Mines documents are currently appearing. (1) Preprints from Minerals Yearbook 1947 are being issued in pamphlet. For this year the subjects are grouped in booklets ranging upward from 32 pages each; separate pamphlets for each individual commodity are not available, but requests by commodity can be handled by either the bureau or Superintendent of Documents. (2) Preliminary statistics for production in 1948 are being issued currently in the Mineral Market Reports, the customary mimeographed leaflets. It is anticipated that the commodity summaries of this character will all be available by early summer, or soon thereafter. Requests by commodity should be addressed to the bureau in Washington.

Copyright Law of United States of America. Library of Congress leaflet. Price 15 cents. This in effect is a codification of the law as applicable to copyright practice, especially the act of 1947 and subsequent amendments.

Foreign Commerce and Navigation of the United States. Available in part for calendar year 1945. Vol. I, covering U. S. import and export statistics, available at $3.75. Vol. II when issued will include export transport statistics.

Sampling and Analysis of Mine Atmospheres. Bureau of Mines, Miners' Circular 24 (revised). Price 25 cents. Gives complete instructions for sampling and analysis in the field by methods of much wider applicability than to mine gases.

Preserving Cotton Fabrics in Outdoor Use. By J. D. Dean. U. S. Department of Agriculture, Circular No. 790. Price 10 cents. Includes a section on protective treatments and formulas for various kinds of weatherproofing.

Grasshopper Control Improved by New Insecticides. By Claude Wakeland and J. R. Parker. Bureau of Entomology and Plant Quarantine, EC-7.

Dimensional Changes in Certain Cotton, Wool, and Rayon Woven Fabrics During Various Cleaning and Pressing Processes. By Hazel M. Fletcher and M. Virginia Jones. U. S. Department of Agriculture, Circular No. 793.

Barite Deposits of Camamu Bay State of Bahia, Brazil. By A. J. Bodenlos. U. S. Geological Survey Bulletin 960-A. Price 75 cents.

Manganese Deposits of Mexico. By Parker D. Trask and Jose Rodriguez Cabo, Jr. U. S. Geological Survey Bulletin 954-F. Price 35 cents.

Water Levels and Artesian Pressure in Observation Wells in the United States in 1945. Series of water supply papers report-

(Continued)

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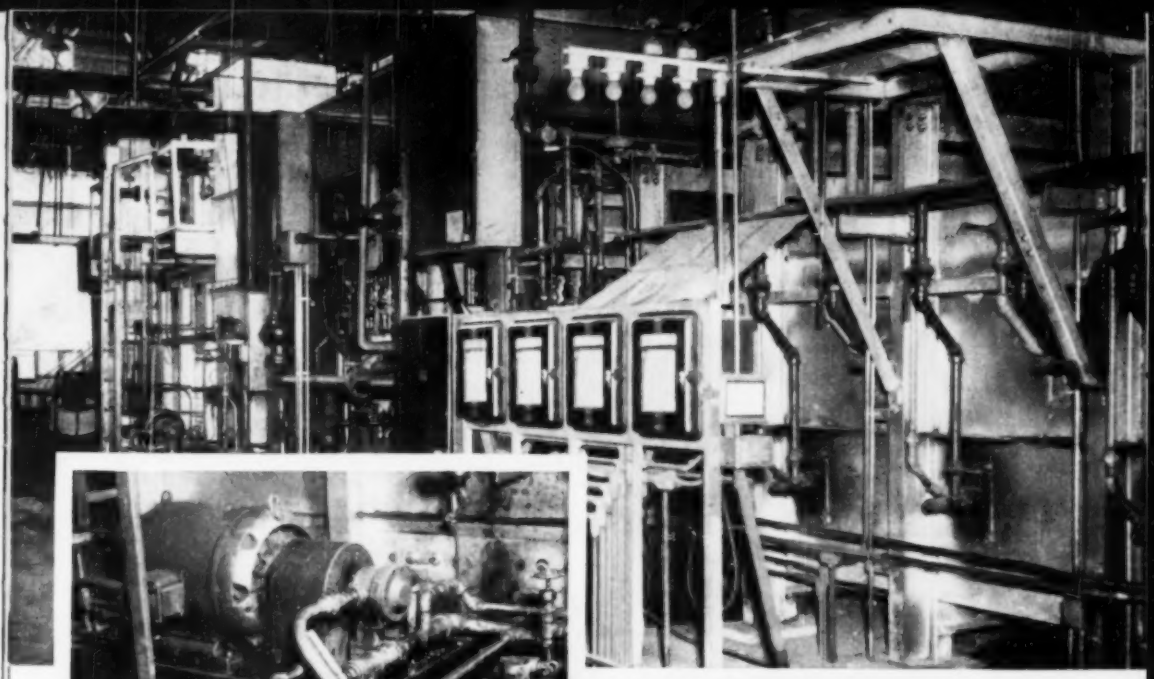


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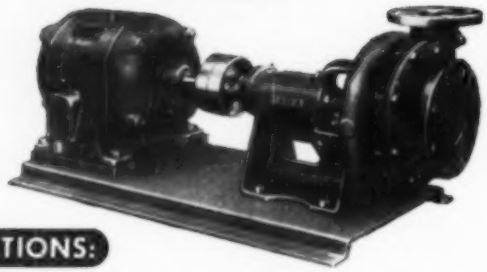
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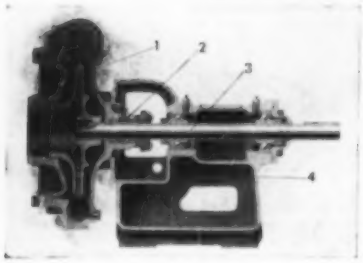
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GOVT. PUBS., cont. . .

ing data from field observation by regions. Thus far available are Part I, Northeastern States, U. S. Geological Survey Water-Supply Paper 1023, Price 70 cents; and Part IV, South-Central States, Water-Supply Paper 1026, Price 45 cents. Comparable reports for all regions will be available shortly.

Agricultural Geography of Europe and the Near East. Unnumbered report of Office of Foreign Agriculture, U. S. Department of Agriculture. Price $1. This is an elaborate illustrated survey including colored maps and charts and giving background information essentially like a commercial geography.

Definitions and Standards for Food. Food and Drug Administration, Food, Drug, and Cosmetic No. 2, Rev. 1. This is a compilation of all the standards of identity and quality applicable to foods on Oct. 30, 1948. Since few new standards or modifications had occurred during the subsequent four months, the compilation is essentially applicable as of March 1949. The material indicates requirements, limits, and labeling provisions applicable for chemical and vitamin additions to standardized foods.

Handbook of Labor Statistics. Bureau of Labor Statistics, Bulletin 916. Price 75 cents. This 1947 edition includes each major bureau statistical series from its beginning to 1946, and also important related statistics collected by other public agencies on social security, production, income, and expenditures.

Synthetic Liquid Fuels from Hydrogenation of Carbon Monoxide. By H. H. Storch et al. Bureau of Mines Technical Paper 709. Price 50 cents.

Application of Ion Exchange Resins in the Cyanidation of a Gold and Silver Ore. By S. J. Hussey. Bureau of Mines, Report of Investigation R. I. 4374. Mimeographed.

Effect of Operating Variables Upon the Fischer-Tropsch Synthesis. By Sol Weller. Bureau of Mines, Report of Investigations, R. I. 4405. Mimeographed.

Synthetic Liquid Fuels. A group of three Bureau of Mines documents which constitute 1948 annual report of Secretary of Interior. Part I.—Oil from Coal, Report of Investigations R. I. 4456. Part II.—Oil from Oil Shale, Report of Investigations R. I. 4457. Part III.—Liquid Fuels from Agricultural Residues, and Part IV.—Secondary Recovery, and Petroleum Chemistry and Refining Research, Report of Investigations R. I. 4458. Mimeographed.

Disposal of Radioactive Wastes. Atomic Energy Commission, Press information release No. 154 (supplement). Mimeographed. A digest of proceedings of the seminar on the disposal of radioactive wastes, sponsored by the U. S. Atomic Energy Commission, Jan. 24-25, 1949.

World Electrical Current Characteristics. By O. B. Hall. Office of International Trade, Industrial Series No. 83. Price 15 cents. Identifies electrical characteristics which must be met by equipment for use anywhere in the world.

Statistics of Natural Gas Companies. Federal Power Commission. FPC S-66. For sale only by Federal Power Commission, Washington 25, D. C. Price $2., cloth bound. Excellent aid to market studies and plant location inquiries where natural gas supply is significant.

Fire-Retarding Coatings. By A. Van Kleeck. Forest Products Laboratory, No. R1280 (revised edition). Available only from Forest Products Laboratory, Madison 5, Wisc. A resume of recognized formulas for chemical treatment of wood surfaces and combustible materials.

Interpretations of the Regulations for the Enforcement of the Federal Insecticide, Fungicide, and Rodenticide Act. U. S. Department of Agriculture Service and Regulatory Announcements No. 167.

Service Tests on Posts as a Means of Evaluating Wood Preservatives and Methods of Treatment. By J. Oscar Blew, Jr. Forest Products Laboratory, No. D1726. Available only from Forest Products Laboratory, Madison 5, Wis. Suggestions as to procedure that should be used in order to obtain the maximum benefits from service tests on treated posts.

—End



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MANUFACTURERS' LATEST PUBLICATIONS

Publications listed here are available from the manufacturers themselves, without cost unless a price is specifically mentioned. To limit the circulation of their literature to responsible engineers, production men and industrial executives, manufacturers usually specify that requests be made on business letterheads.

Tubular Heaters. *Black, Sivalls & Bryson, Inc., 720 Delaware Ave., Kansas City 6, Mo.*—24-page bulletin (Part 5, Section 3, Catalog 58) describes the various types of direct-fired tubular heaters produced by this company. Various applications and specifications for the different sizes of standard units are included. These units are all produced for installation outdoors.

Hoists. *Detroit Hoist & Machine Co., 8201 Morrow St., Detroit 11, Mich.*—48-page booklet describes the various types of hoists and cranes produced by this company. Included are electric hoists, pneumatic hoists, and traveling cranes.

Lubricators. *Bijur Lubricating Corp., 43-01 22nd St., Long Island City 1, N. Y.*—24-page Bulletin No. 4C describes the lubricating equipment produced by this company, particularly for applications involving small quantities of oil. Specifications are given for the machines which vary in output from .04 to 20 c. c. per hr.

Electric Batteries. *Gould Storage Battery Corp., Trenton 7, N. J.*—40-page handbook gives maintenance information and engineering data on a rubber jar battery produced by this company. Capacities are given for the various sizes of batteries.

Wetting Agent. *Solvay Sales Division, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.*—13-page booklet entitled "Use of Nytron in Pickling Steel Products" describes this use for the surface active material produced by this company. The wetting agent is an anion-active synthetic detergent with polar groups that are predominantly sulphonate, and with a hydrocarbon tail derived from petroleum. Use of this material in the pickling solution is said to give a reduction in the pickling time.

Crane. *Bucyrus-Erie Co., 7823 W. Greenfield Ave., Milwaukee, Wis.*—12-page Bulletin No. H-3-1 describes the three-ton, hydraulic truck crane produced by this company for use particularly in the construction industry. The unit has hydraulic outriggers which enables it to get greater lifting capacity. Various accessories are also shown.

Acrylic Monomers. *Rohm & Haas Co., Washington Square, Philadelphia 5, Pa.*—24-page booklet describes the properties and reactions of the various types of acrylic and methacrylic esters produced by this company. Information is given on polymerization, as well as reactions of these materials with other organic chemicals.

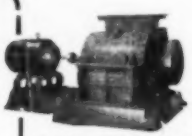
Fluid Drives. *American Blower Corp., Detroit 32, Mich.*—4-page Bulletin No. 8519 describes the motors coupled with a fluid drive produced by this company as a packaged unit. Advantages of these units include low starting power requirements and shock absorption by the fluid coupling. They are available in sizes from 1 to 20 hp.

Conveyor. *Hapman Conveyor Co., 2405 W. McNichols St., Detroit 21, Mich.*—4-page bulletin describes the tubular cable-type conveyor produced by this company for conveying dry solids, particularly where contamination must be prevented. This

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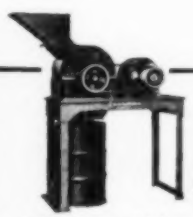
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"KC" Plastics Grinder—reduces thermoplastic sprues, rejects. Capacities to 450 lbs. per hour.

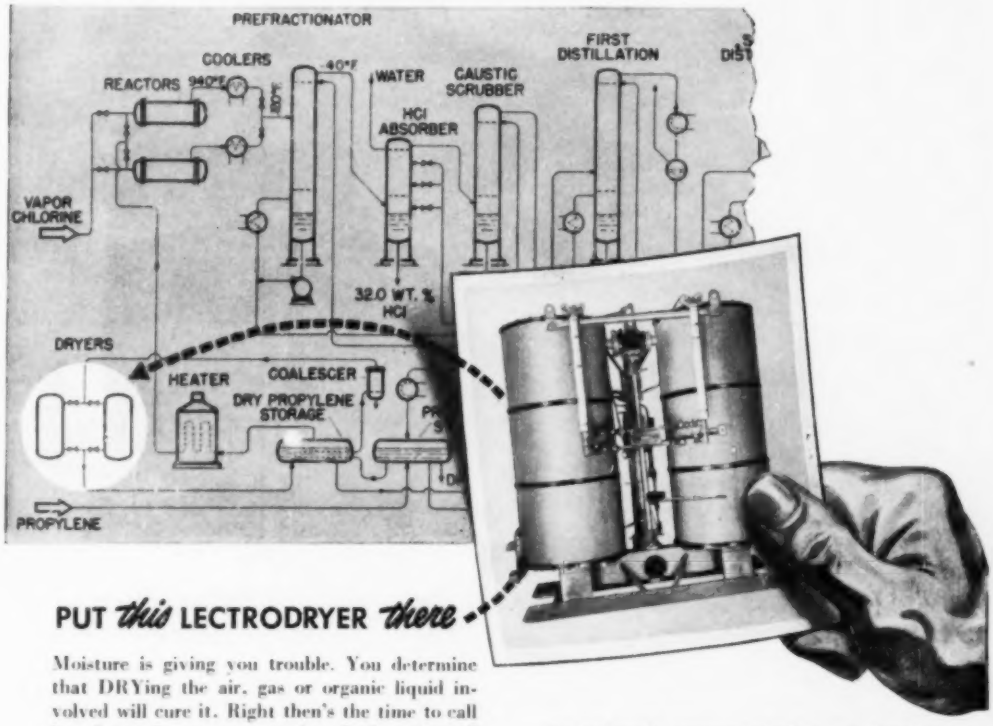

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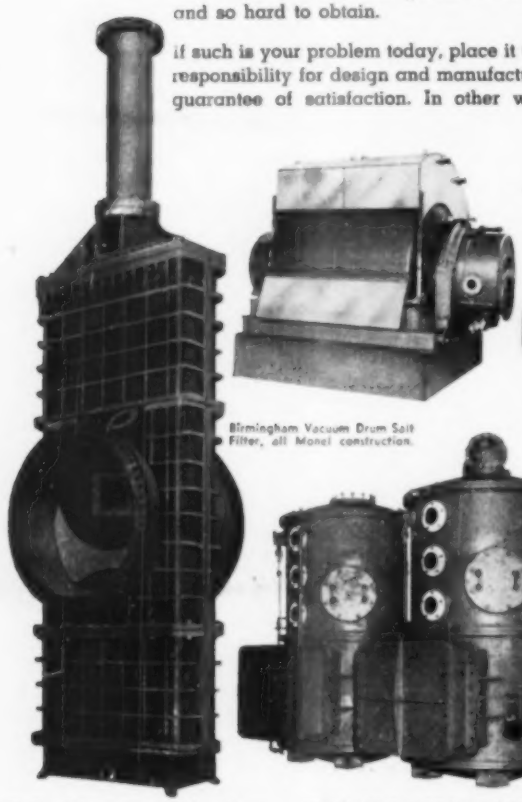
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MFRS.' PUBS., cont. . .

unit operates by spaced wipers, which carry the material through the tube ahead of them.

High-Temperature Mortar. *Ironton Fire Brick Co., Ironton, Ohio.*—4-page bulletin describes applications and methods of use for the high-temperature bonding mortar produced by this company. The mortar can be obtained either wet or dry and is air setting.

Welding Rod. *Lincoln Electric Co., Cleveland 1, Ohio.*—8-page Bulletin No. 463 describes the electrodes produced by this company for welding stainless steel. Information is given on various applications, together with the procedure to be used to obtain the best possible welds.

Steam Traps. *V. D. Anderson Co., 1935 W. 96th St., Cleveland 2, Ohio.*—36-page booklet entitled "How to Choose a Steam Trap" describes various methods for the best installation of steam traps for a number of different applications. Included are unit heaters, jacketed kettles, autoclaves, and submerged surfaces. Information is also given on proper maintenance of traps.

Permanent Magnetic Pulleys. *Stearns Magnetic Mfg. Co., Milwaukee 4, Wis.*—Bulletin No. 350 describes the new line of permanent magnetic pulleys produced by this company. Specifications, dimensions, capacities and typical applications of these units are given.

Level Gage. *Jerguson Gage & Valve Co., 80 Fellsway, Somerville 45, Mass.*—2-page bulletin describes the remote control level gage produced by this company, particularly for reading boiler water levels. The unit is based on the principle of an inverted U-tube manometer.

Process Equipment. *American Chain & Cable Co., Bridgeport 2, Conn.*—24-page booklet No. DH-500 is a catalog which lists the complete line of products manufactured by this company's divisions and associate companies.

Acid-Proof Cement. *Sauereisen Cement Co., Sharpsburg Station, Pittsburgh 13, Pa.*—6-page bulletin gives specifications, technical information, and prices for the types of acidproof cement produced by this company. Applications indicated include acid pickling tanks, acidproof floors, and stacks.

Ferric Chloride. *Pennsylvania Salt Mfg. Co., 1000 Widener Bldg., Philadelphia 7, Pa.*—12-page leaflet gives information on the properties, uses and methods of handling ferric chloride. Various applications for this chemical are indicated, including its use as a coagulant, a catalyst, an etching agent, and as a mordant in dyeing.

Chemicals. *Mathieson Chemical Corp., 60 East 42nd St., New York 17, N. Y.*—32-page booklet entitled "Mathieson Chemicals" gives a brief description of the method of production, properties, and applications of the various chemicals produced by this company. The booklet also includes a description of the recently developed stationary mercury cell for the production of chlorine and caustic soda.

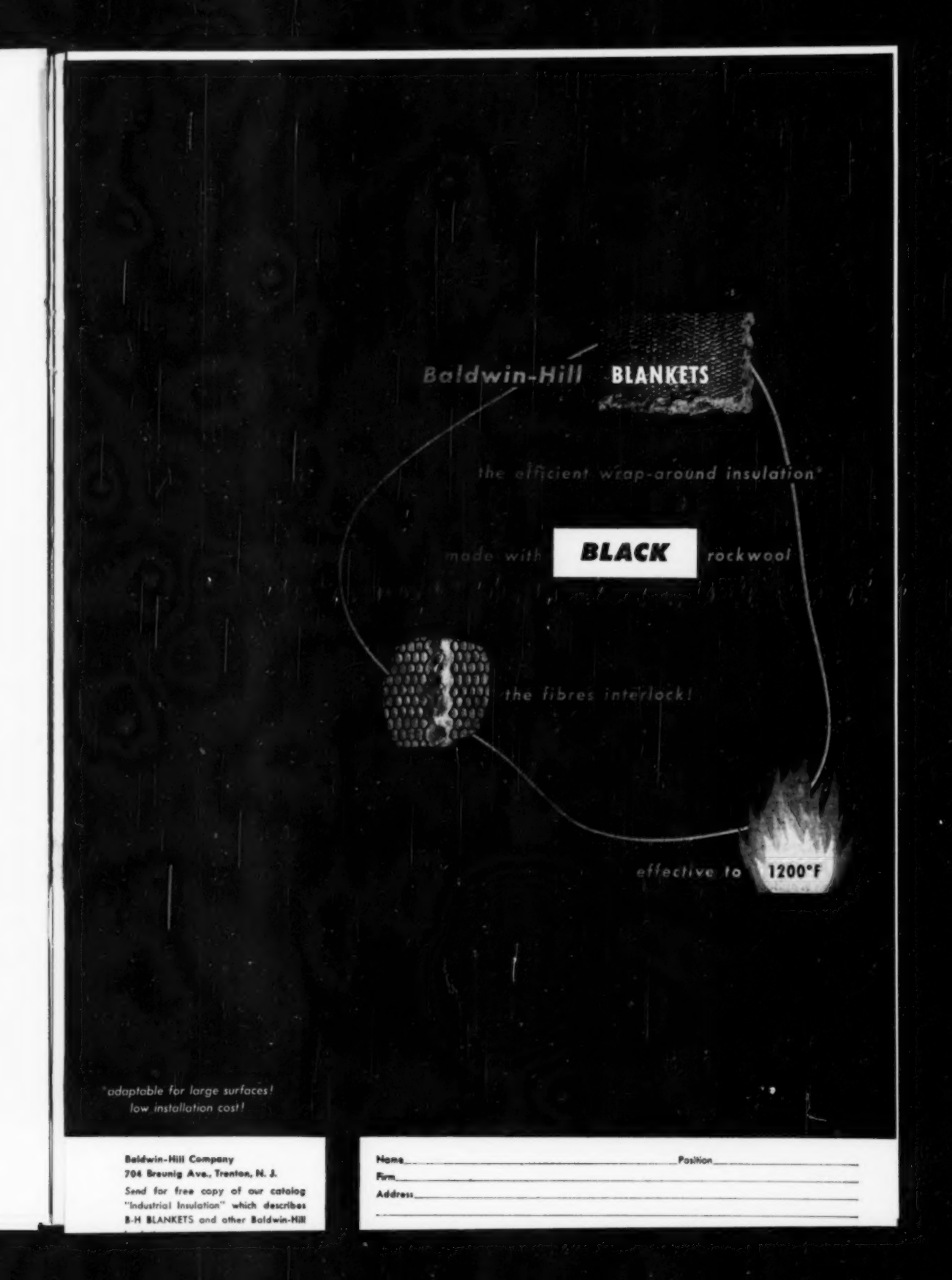
Process Equipment. *Denver Equipment Co., 1400-17th St., Denver, Colo.*—Three new bulletins describe three of the various types of equipment produced by this company for the process industries. Bulletin No. C12-B describes jaw crushers. Bulletin No. F8-B describes diaphragm pumps. Bulletin No. F8-B describes rotary vacuum filters.

Heat Exchangers. *Foster-Wheeler Corp., 165 Broadway, New York 6, N. Y.*—8-page brochure describes the four different types of Karbate heat exchangers produced by this company. They include the packed floating head type, the packed shell cover type, the inclosed floating head type, and the diaphragm type. The corrosion resistance of the material is indicated.

Air Venting. *Sarco Co., Empire State Bldg., New York 1, N. Y.*—8-page Technical Bulletin No. 3 describes the system developed by this company for draining and air-venting paper machine cylinders. Advantages of this system are listed.

Insulation. *Johns-Manville Co., 22 East 40th St., New York 16, N. Y.*—4-page folder describes the mineral wool insulation produced by this company, particularly for insulation at very low temperatures. The

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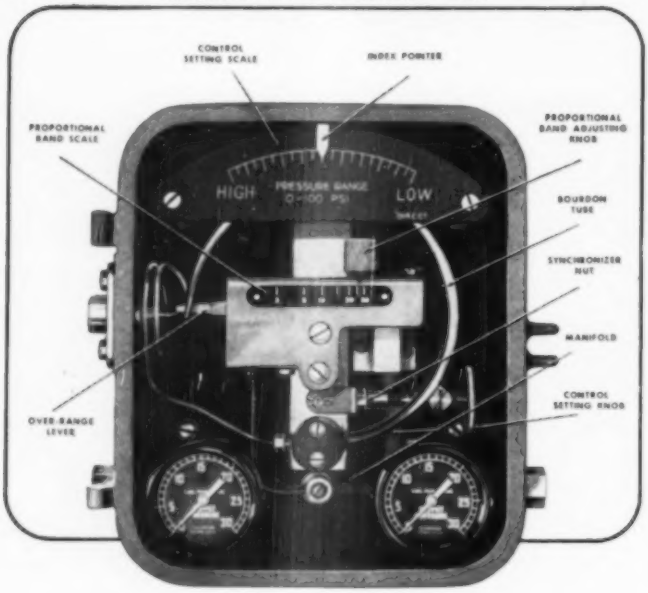
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Providing Precise Response and Proportional Control at Moderate Cost



These controllers are designed for many industrial applications requiring accurate control where more expensive instruments are not warranted.

Applications include, among many others, pump governors, steam pressure reducing stations, gas well pressure reduction, etc., requiring small to intermediate proportional band.

The case is rugged and suitable for outdoor service; it is so designed that it may be mounted on the valve (on integral pad or by means of a U-clamp) or, *if the occasion arises, it may be removed from the valve and mounted on a wall.* A flush type case is also available for panel mounting.

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MFRS.' PUBS., cont. . .

temperature limits on the material are from 250 deg. F. above zero to 400 deg. F. below zero. A table of properties is given.

Grid Trays. *Kerlow Steel Flooring Co., 220 Culver Ave., Jersey City 5, N. J.*—4-page catalog No. G-48 describes the various types of grid trays produced by this company. A table of safe load limits is given. Various applications are indicated.

Chemicals. *Wright Chemical Corp., 627 West Lake St., Chicago 6, Ill.*—8-page bulletin describes the various types of chemicals produced by this company for water conditioning. Included are chemicals for scale control, corrosion inhibitors, and chemicals for algae control.

Conical Mills. *Hardinge Co., 240 Arch St., York, Pa.*—36-page Bulletin No. 17-B describes the use of conical mills for dry grinding. Detailed specifications are given for ball mills and pebble mills, information is given on best methods of operating these units, and a section describes various applications for these mills.

Instruments. *Moore Products Co., H & Lycoming Sts., Philadelphia 24, Pa.*—8-page Bulletin No. 102 describes the differential pressure transmitter produced by this company for measuring and amplifying differential pressures. Complete specifications of these units are given, and methods of installation and application are given. Capacities of the standard size units are given.

Waste Treatment. *Infilco, Inc., 325 W. 25th Place, Chicago 16, Ill.*—8-page Bulletin No. 70 briefly describes the various methods used by this company to treat undesirable waste, either by chemical or biological methods. Various applications are indicated, and the equipment used is described.

Compressors. *White-Both Machine Co., West 19th St., Lorain, Ohio.*—2-pages Bulletin No. F-2000 briefly describes the 30-hp., diesel-driven compressor produced by this company. These are horizontal type units which can be either single or two-stage.

Anti-Corrosion Strap Selector.—*A. J. Gerrard & Co., 1950 N. Hawthorne Ave., Melrose Park, Ill.*—Circular slide rule selects the best type of metal for use in strapping equipment or products for shipping, where particular corrosive conditions may prevail. Seven different types of metal are included, and a large number of chemicals, gases and different atmospheric conditions are included in the selector.

Shellac. *William Zinsser & Co., 516 W. 59th St., New York 19, N. Y.*—16-page bulletin describes the various types of shellacs produced by this company. Various applications for these shellacs are given.

Dust Filters. *W. W. Sly Mfg. Co., 4700 Train Ave., Cleveland 2, Ohio.*—8-page Bulletin No. D-491 describes various actual installations of the dust filters manufactured by this company.

Water Cooling Equipment. *Binks Mfg. Co., 3122 Carroll Ave., Chicago 12, Ill.*—This catalog describes the water cooling equipment and industrial spray nozzles produced by this company. Engineering data, specifications, and applications are discussed.

Glass Equipment. *Carboline Co., 7803 Forsythe Blvd., St. Louis 5, Mo.*—4-page Bulletin No. C-1 describes the proper method of repairing glass-lined or glass-coated equipment with the cements produced by this company. Complete information is given for both permanent and temporary repairs.

Refrigeration Condensers. *Henry Vogt Machine Co., 10th & Ormsby Sts., Louisville 10, Ky.*—22-page Bulletin No. RC-1 describes the refrigeration condensers produced by this company for use with either ammonia or Freon refrigerants. Specifications, sizes, heat transfer surface and list prices are given.

Dicyandiamide. *American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y.*—40-page booklet gives complete information on the physical, physiological, and chemical properties of dicyandiamide. Included also is an extensive bibliography.

Lift Trucks. *Barrett-Cravens Co., 4609 S. Western Blvd., Chicago 9, Ill.*—28-page Bulletin No. 4083 describes the line of lift trucks manufactured by this company.

(Continued)

Complete specifications are given for these trucks which range in capacities from 1,000 to 15,000 lb.

Steel Buildings. *Butler Mfg. Co., Kansas City, Mo.*—12-page bulletin describes the rigid frame steel buildings produced by this company. These buildings are aluminum coated and come in standard widths of 20, 32 and 40 ft.

Welding Fittings. *Globe Steel Tubes Co., Milwaukee 4, Wis.*—12-page loose-leaf catalog describes the various types of welding fittings produced by this company. Complete specifications, diameters, wall thicknesses, weights and list prices are given for such items as returns, and elbows of short and long radius.

Refractories. *Babcock & Wilcox Co., 85 Liberty St., New York 6, N. Y.*—16-page Bulletin No. R-22 describes the refractory castables, plastics and mortars produced by this company. Applications are indicated for these products, which have temperature limits as high as 3,000 deg. F.

Stainless Steel Fittings. *Electric Steel Foundry Co., 2141 Northwest 25th Ave., Portland 10, Ore.*—6-page Bulletin No. 165-A describes the various types of stainless steel fittings produced by this company, including screwed fittings and flanges. 4-page Bulletin No. 166 describes a special alloy produced by this company, which is useful because of its corrosion resistance to sulphuric acid.

Electromagnets. *Ohio Electric Mfg. Co., Cleveland, Ohio.*—4-page Bulletin F-2001 describes the various sizes and types of electric magnets produced by this company for separation of tramp iron in material moving over conveyors. Dimensions, weight and capacities of these units are given.

Storage Racks. *Barret-Cravens Co., Chicago, Ill.*—16-page Bulletin No. 4873 describes the various types of storage racks this company produces for storing barrels and drums in tiers. Racks for the storage of skids are also shown. Various examples are shown of the way in which this system saves storage space.

Cranes. *Thew Shovel Co., Lorain, Ohio*—16-page bulletin describes the various types of self-propelled cranes produced by this company for industrial material handling and construction operations. Various applications of these cranes are shown.

Transformers. *General Electric Co., Schenectady, N. Y.*—80-page booklet No. GEA-4626B gives detailed information on the standard instrument transformers manufactured by this company. Prices and ratings are given for such transformer types as potential transformers, current transformers, metering outfits, and portable transformers.

Gas Burners. *Eclipse Fuel Engineering Co., Rockford Ill.*—Two new bulletins describe the packaged gas and air premix system and the packaged gas-fired burner produced by this company. A third bulletin describes the diluter available for standby use where propane is used as a fuel substitute demanded in excess of regular gas supply.

Chlorine Wall Chart. *Hooker Electrochemical Co., Niagara Falls, N. Y.*—This wall chart gives recommendations for safety in the use and handling of liquid chlorine cylinders and some containers.

Conveyors. *Whiting Corp., Harvey, Ill.*—A series of new catalogs describe the monorail materials handling equipment produced by this company. The various fittings and accessories are also described. The systems are built in capacities from 500 to 20,000 lb.

Silicone Rubber. *General Electric Co., Pittsfield, Mass.*—24-page Bulletin No. CDP-584 describes the specifications and applications for the silicone rubber produced by this company. A table is given of the chemical resistance of this rubber to various corrosive agents.

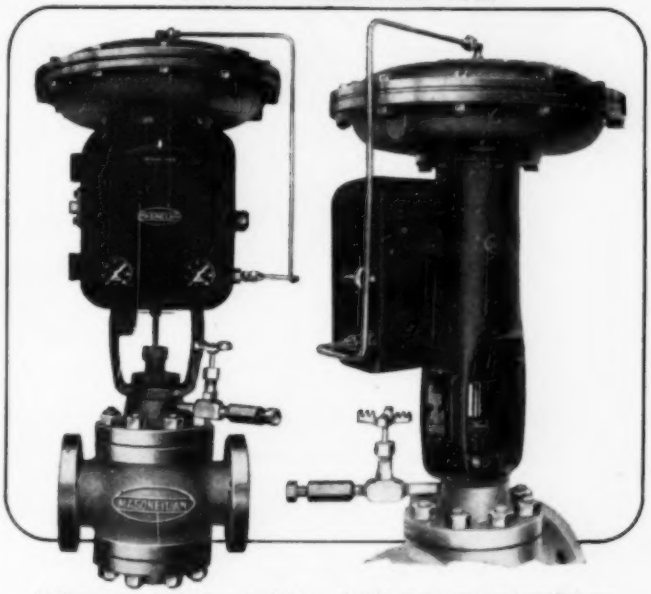
Corrosion-Resistant Castings. *The Fahralloy Co., Harvey, Ill.*—4-page bulletin describes the various types of chrome-nickel alloy castings produced by this company for applications involving high temperatures or corrosive conditions.

—*End*

Check These Outstanding Features of the New

No. 2700 Pressure Controllers

Providing Precise Response and Proportional Control at Moderate Cost



1. Pneumatic proportionality accomplished with feed-back bellows and cantilever leaf spring.
2. Direct nozzle and flapper pilot with metering restriction.
3. Large powerful bourdon tube for greater response and control performance.
4. Adjustable proportional band between 3% and 50%.
5. Wide selection of pressure ranges.
6. Cases for valve or wall mounting; also flush panel mounting.
7. Ease and accessibility of adjustments.
8. When steel construction is specified, controlled pressure connection, tubing to bourdon tube and entire bourdon tube assembly, are supplied with Type 316 Stainless Steel, in order to avoid corrosive effects.
9. Unit construction (proportional mechanism, nozzle block, etc.) and manifold.
10. Control action reversible with either bourdon or bellows.
11. Manifold construction prevents transmission of any possible case distortion to control mechanism.
12. Set point indication.

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Anhydrous Citric Acid offers a more economical source of this acid, and at the same time you assure yourself of Pfizer quality. By using Pfizer Citric Acid Anhydrous you benefit from these savings:

First, you save on *shipping expense* because Pfizer Citric Acid Anhydrous contains no water of crystallization, and you pay freight only on the citric acid you buy and not on water! Figures show you pay freight on only 91.42 lbs. of acid instead of the full 100 lbs. of normal U.S.P. Citric Acid. This means over 8½% less on every freight bill!

Second, you save on *storage space* and *handling charges* because 10 drums of Citric Acid Anhydrous are equivalent to 11 drums of the U.S.P. acid. This means you eliminate one drum out of every eleven you formerly stored and handled.

Citric Acid Anhydrous is a granular product, identical in purity with the U.S.P. Citric Acid, and differs only in that it contains no water of crystallization.

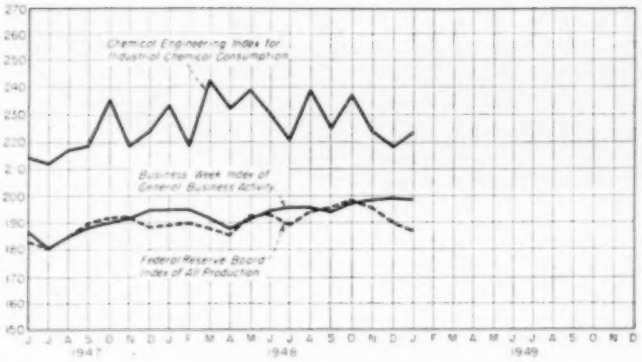
Solutions prepared with Citric Acid Anhydrous are identical with Citric Acid U.S.P. provided, of course, that you make allowance for the water always present in the U.S.P. acid. And, unlike the U.S.P. Acid, the Citric Acid cannot dry out, thus overcoming any possible variations in the resulting acidity of your solutions. For further details, please inquire of Chas. Pfizer & Co., Inc., 630 Flushing Ave., Brooklyn 6, N. Y.; 211 E. North Water St., Chicago 11, Ill.; 605 Third Street, San Francisco 7, Calif.

PFIZER

Manufacturing Chemists Since 1849

Chemical Economics

RICHARD F. WARREN, *Assistant Editor*



Index Itemized

Chemical Engineering Index

Industrial Consumption of Chemicals

	December	January
Fertilizers	49.60	50.31
Pulp and paper	23.30	23.81
Petroleum refining	22.21	22.00
Glass	16.35	17.80
Paint and varnish	18.26	21.30
Iron and steel	14.20	15.00
Rayon	27.15	27.21
Textiles	10.08	10.01
Coal products	11.10	11.03
Leather	3.94	4.25
Explosives	7.28	6.66
Rubber	4.81	5.13
Plastics	8.64	8.60
INDEX	217.02	223.11

1935 = 100

Process Industries Hold Up Well as Postwar Adjustments Continue

BUSINESS was good in the first quarter of 1949, but there was considerable spottiness in some segments of the process industries as the postwar kinks were ironed out and companies buckled down to meet the competitive markets that returned as 1948 bowed out. For example, in the glass industry container production picked up early in the year. Meanwhile plate glass operations continued at a high rate.

Steel, one of the big chemical consumers, has been setting new records this year. In January more than 8 million net tons of steel ingots and castings were produced. This is more than the annual 1948 production of steel in any other country except Great Britain and Russia. Late in March the industry had been operating at over 100 percent of capacity for ten consecutive weeks. This is the longest period of sustained overcapacity production ever attained.

Textile industry, another chemcial consumer was operating at levels below the corresponding 1948 periods, while the leather industry rose above its late 1948 slump at the beginning of the year.

In January production of ammonium sulphate from coke-oven ammonia was 73,990 tons. This is down slightly from the December production. On the other hand, production of ammonium sulphate from purchased, synthetic ammonia was up to 4,326 tons or 17 percent above December production from this source. Data released by the government on production of ammonium sulphate in 1948 show that we produced 1,057,205 short tons last year. Since 105,887 tons was imported and 210,491 tons was exported, there was 952,600 tons available for the domestic market. Production was split as follows: coke-oven byproduct ammonia yielded 830,938 tons; from synthetic ammonium sulphate came 195,441 tons; and coke plants used synthetic ammonia to make an additional 30,826 tons.

Fertilizer industry spokesmen speaking before Congress last month expressed the opinion that present industry plans for increased production totaling from 150,000 to 200,000 tons of nitrogenous fertilizers in 1950 should be sufficient to take care of domestic requirements and that the government's Army fertilizer output should not be directed to domestic use.

Consumption of potash in North America continued to grow in 1948. According to the American Potash Institute, deliveries were up 7.6 percent above 1947 levels when measured in terms of K_2O. Shipments from France and Germany totaled 40,069 tons of K_2O equivalent. Last year chemical uses took 132,787 tons of muriate of potash (83,353 tons K_2O). Sulphate of potash used in the chemical industry rose to 9,301 tons (4,673 tons K_2O). Deliveries of all types to the chemical industry were 6 percent above 1947.

International Minerals & Chemical Corp., one of the four major potash fertilizer producers in the country, has announced an expansion of its output at Carlsbad, N. M. It has built a new potassium chloride refinery there to make a high grade KCl which is in considerable demand in the electrolytic production of caustic potash. The new refinery is said to have an annual capacity of more than 20,000 tons per year.

In the rubber industry a new cold rubber plant began operations last month as United States Rubber Co. started producing the material at Naugatuck, Conn. The unit has a capacity of 2,500 tons of cold rubber per year and represents about 8 percent of the plant's rubber capacity. The rubber industry is working on new uses for this material in saturated papers, adhesives, wire insulation, foam rubber, gaskets, and brake linings. It has already been used to improve tire-tread wear by 30 percent.

In the past month Monsanto Chemical Co. reported that the oil additive industry has grown to a position where annual sales now total $35,000,000 a year. An example of the growth of chemicals in this field is found in phosphorus pentasulphide. In 1948 it is reported that at least 1,500 tons of this chemical was used as an antioxidant in petroleum oils. Historical uses of the chemical totaled 700 tons.

PROBLEM:

How to find reliable compressors for SO_2 SEPARATION OF OILS

SOLUTION:



CHOOSE Carrier Centrifugal Compressors. Because the bearings of a Carrier Centrifugal are isolated from the gas space, they are ideally suited for use in compressing SO_2, as well as in many other processes requiring the compression of large volumes of propane, butane, or other solvents and refrigerants.

Developed by Carrier engineers through more than a quarter-century of research and practical experience, these Compressors incorporate the latest refinements of centrifugal design. They are ruggedly built to Carrier's exacting standards, and run for years without the maintenance problems on pistons, valves, etc., that are common with reciprocating equipment. They are extremely compact, and can be operated without housing, expensive foundations or even piling.

Carrier, a pioneer in the field of centrifugal refrigeration, has recently expanded its facilities to take care of the ever-increasing demand for its products. This demand reflects the records of Carrier Centrifugal Compressors in actual use — they deliver efficient, economical performance year in, year out, year after year. They are now available for prompt delivery. Whatever the application, you can count on them for a long life of dependable, low-cost service. Carrier Corporation, Syracuse, New York.

Carrier CENTRIFUGAL COMPRESSORS • REFRIGERATION EQUIPMENT

HYDROCHLORIC ACID

Byproduct Acid Creates Some Local Surpluses but Growth Continues

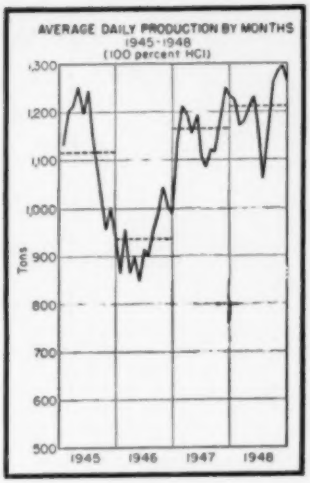
A. J. P. WILSON and R. F. WARREN

Among the major heavy chemicals is hydrochloric acid. It is a chemical with a wide variety of markets. Its major uses are in pickling of metals for scale removal, sugar cane refining, synthetic rubber production, as well as production of glucose and corn sugar from starch. Now the Dowell process for activating petroleum wells is consuming very large quantities of the acid in the southwest and other petroleum producing areas of the country. In addition to these, the end uses of the acid include glue production, fine chemicals operations, leather processing, textile and rayon operations, dyes, rubber reclaiming, fatty acids, and pigment operations. It is sold commercially in four grades: 18 deg. Be., 20 deg. Be., and 22 deg. Be. These grades are generally technically pure and are yellow in color. However, the 20 deg. Be. grade is available as a colorless liquid. C. P. acid is also made.

There are really four processes by which hydrochloric acid is produced currently in this country: The first and for a long time the only commercial method of manufacturing the acid was in a furnace of the Mannheim type. Sodium chloride is treated with sulphuric acid at high temperatures with agitation. The resulting coproducts are salt cake (96 percent Na_2SO_4) and hydrochloric acid. The latter gas ranges between 40 percent and 70 percent HCl. It is generally sold as 20 deg. Be.(32 percent). The furnaces are operated on a 24 hour basis and range in size from small with a production of 5-6 tons of sodium sulphate and 3 tons of gas (100 percent acid), to the large size which produces about 10 tons of salt cake and 18 tons of 20 deg. Be. (32 percent acid).

The second method is known as the Hargreaves—it was patented in 1870 in England where it was used extensively until the 1920's. Here in the United States only one producer uses this method. It consists of passing SO_2 through the salt laying on perforated false bottoms in stacks within vertical chambers. The co-products of this process are the same as those of the furnace operation. While it is believed that this method is no longer used in England due to the high cost of hand labor involved, it is worked successfully in Louisiana.

(Continued)



Mr. Wilson is a consulting chemical engineer with considerable background in market analysis and new product development. His office is in Great Neck, N. Y. Mr. Warren is an Assistant Editor, Chemical Engineering.

Half a hundred companies with 74 plants turn out hydrochloric acid at a combined rate of nearly a ton a minute

Company	Location	Method
American Cyanamid Co.	Warners, N. J.	Salt + H_2SO_4
American Agricultural Chemical Co.	Detroit, Mich.	Salt + H_2SO_4
Amerco	Henderson, Nev.	Byproduct
American Firstoline Co.	New York, N. Y.	Byproduct
Bay Chemical Co.	Weeks, La.	Hargreaves
Belle Alkali Co.	Belle, W. Va.	Byproduct
Benzol Products Co.	Piscataway, N. J.	Byproduct
Brown Co.	Berlin, N. H.	H_2+ Cl_2
Carbide and Carbon Chemicals Corp.	South Charleston, W. Va.	Byproduct
	Texas City, Tex.	Byproduct
Celanese Corp. of America	Newark, N. J.	Byproduct
Chemical Products Corp.	Cartersville, Ga.	Byproduct
Cincinnati Chemical Works	Norwood, Ohio	Byproduct
Consolidated Chemical Industries	Fort Worth, Tex.	Salt+ H_2SO_4
	Houston, Tex.	Salt+ H_2SO_4
Cornwell Chemical Corp.	Cornwells Heights, Pa.	
Diamond Alkali Co.	Painesville, Ohio	Byproduct
	Houston, Tex.	H_2+ Cl_2
Dow Chemical Co.	Midland, Mich.	H_2+ Cl_2 and byproduct
	Freeport, Tex.	H_2+ Cl_2 and byproduct
	Pittsburg, Calif.	H_2+ Cl_2 and byproduct
E. I. du Pont de Nemours & Co.	East Chicago, Ind.	Salt + H_2SO_4
	Cleveland, Ohio	Salt + H_2SO_4
	Lockland, Ohio	Salt + H_2SO_4
	Grasselli, N. J.	Salt + H_2SO_4
	Niagara Falls, N. Y.	Byproduct
	Deepwater, N. J.	Salt + H_2SO_4
Elko Chemical Works	Kings, N. J.	Byproduct
Ethyl Corp.	Baton Rouge, La.	Salt + H_2SO_4 as byproduct
Frontier Chemical Co.	Midland, Tex.	
Goodrich Chemical Co. (Rubber Reserve)	Louisville, Ky.	Byproduct
General Aniline & Film Corp.	Rensselaer, N. Y.	Byproduct
General Chemical Division, Allied Chem. & Dye Corp.	Bay Point, Calif.	Salt + H_2SO_4
	Hegewisch, Ill.	Salt + H_2SO_4
	Marcus Hook, Pa.	Salt + H_2SO_4
	Newell, Pa.	Salt + H_2SO_4
	Buffalo, N. Y.	Salt + H_2SO_4
General Electric Co.	Pittsfield, Mass.	Byproduct
Hercules Power Co.	Hopewell, Va.	Salt + H_2SO_4
	Gillespie, N. J.	Byproduct
Heyden Chemical Co.	Garfield, N. J.	Byproduct
	Memphis, Tenn.	Byproduct
Hooker Electro Chemical Co.	Tacoma, Wash.	H_2+ Cl_2
	Niagara Falls, N. Y.	H_2+ Cl_2
Koppers Co.	Kobuta, Pa.	Byproduct
Mathieson Chemical Corp.	Niagara Falls, N. Y.	H_2+ Cl_2
Meinhardt Co., J. A.	Wyoming, Ill.	Byproduct
Merck & Co.	Rahway, N. J.	Salt + H_2SO_4 and byproduct
Michigan Chemical Co.	Pine Bluff, Ark.	Byproduct
Monsanto Chemical Co.	Texas City, Tex.	Byproduct
	St. Louis, Mo.	Byproduct
	Monsanto, Ill.	Salt + H_2SO_4 and byproduct
	Nitro, W. Va.	Byproduct
	Anniston, Ala.	Byproduct
	Everett, Mass.	
Montrose Chemical Co.	Newark, N. J.	Byproduct
	Henderson, Nev.	Byproduct
Naylee Chemical Co.	Philadelphia, Pa.	Byproduct
Ohio-Apex	Nitro, W. Va.	Byproduct
Ozark-Mahoning Co.	Tulsa, Okla.	
Pennsylvania Salt Mfg. Co.	Wyandotte, Mich.	H_2+Cl_2
	Natrona, Pa.	Salt + H_2SO_4
	Portland, Ore.	
Pittsburgh Plate Glass Co.	New Martinsville, W. Va.	
Rohm & Haas Co.	Bridesburg, Pa.	Salt + H_2SO_4
Sharples Chemicals, Inc.	Wyandotte, Mich.	Byproduct
Smith Agricultural Chemical Co.	Columbus, Ohio	
Solvay Process Division, Allied Chemical and Dye Corp.	Syracuse, N. Y.	Byproduct
Solvent Products Co.	Malden, Mass.	Byproduct
Standard Naphthalene Product. Co.	Kearny N. J.	Byproduct
Stauffer Chemical Co.	Stege, Calif.	Salt + H_2SO_4
Tennessee Products & Chemical Corp.	Chattanooga, Tenn.	
U. S. Industrial Chemicals, Inc.	Baltimore, Md.	Byproduct
Webster, Inc.	Seagraves, Tex.	H_2+ Cl_2

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COMMODITY SURVEY, cont. . .

One of the newer methods developed in the 1920's is the production of acid from chlorine. This is accomplished by burning chlorine in a hydrogen atmosphere. The acid made by this method is of better quality than the first two methods and is believed to be more costly.

In recent years there has been a large expansion in the chlorination of hydrocarbons—especially by the petroleum companies. A large amount of hydrochloric acid is produced as a by-product from these operations. It has been estimated that for the year 1948 from 35 percent to 50 percent of all this acid produced was byproduct acid from chlorinations.

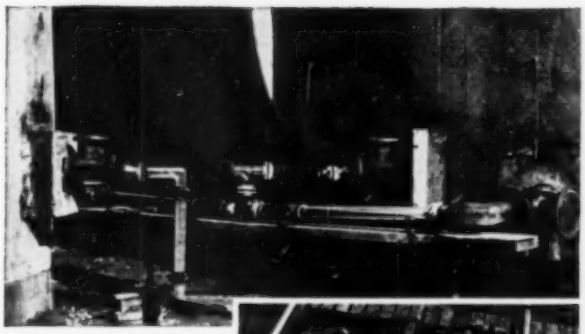
Long term outlook for hydrochloric production indicates a steady growth due to the increasing supply of byproduct acids from chlorination of organic chemicals. However, with the return of a buyer's market, the rate of rise of the multitude of chlorinated compounds will probably be curtailed as competition grows.

Outside of the use of this acid in acidizing oil wells, there has been no great increase in demand for it in the consuming industries. But experts claim that use of acid in wells will continue to grow for at least the next ten years.

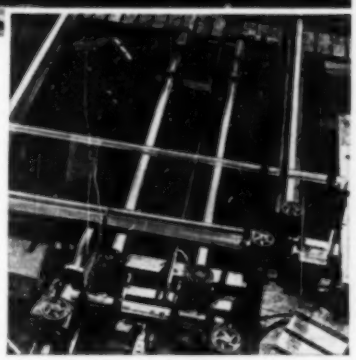
Another factor that points to a slower growth in acid output is the fact that in some areas it is reported that more byproduct acid has been made than the local market could absorb. The price therefore, has softened in that locality. Transportation changes generally do not permit the acid to be shipped long distances economically. These excess productions of the acid and the current shortages of chlorine have induced considerable research and patents on methods of reconverting hydrochloric acid back into chlorine. Patents for such processes were granted to at least five organizations in 1948. This procedure is the direct opposite of the third method of manufacture, burning chlorine to produce HCl.

Prices of hydrochloric acid make an interesting history. In 1890 a ton of acid (20 deg. Be.) cost $20. After dropping down to $16 in 1895 it began to rise in price until 1918 when it sold at $45.40 per ton. It then dropped to a low of $18 in 1925. By 1928 the price was up again to $22 and this price was held until 1937. From 1938 to 1943 the price was $23 per ton. In the period from 1944 to 1946 the price dropped to $22 and in 1947 the average price for 20 deg. Be. acid was $20.15 per ton. In 1948 the average price was $20 and at the time this article was written the price was $20. —*End*

PYREX GLASS PIPE BRAND used for 21 years in bleaching process...



Top Photograph—
Section of PYREX brand Glass Pipe heat exchanger atop plant of Kuehne Chemical Co., Elizabeth, N. J.



Lower Photograph—
Some of the 3,000 ft. of PYREX pipe in use for transferring highly corrosive bleach.

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As the result of its satisfactory performance, more than 3,000 ft. of PYREX brand glass pipe are now in use at this plant, about half of it outside where it is exposed to all weather conditions. In fact, bleach is pumped to the PYREX heat exchanger on top of the plant where it is sprayed with cold water. Only the great resistance of PYREX pipe to thermal and physical shock makes this possible.

According to Mr. R. W. Lillie, Plant Manager, "Maintenance costs are very low. Replacements are infrequent, mostly limited to gaskets, but we do keep spare pipe on hand for any emergency."

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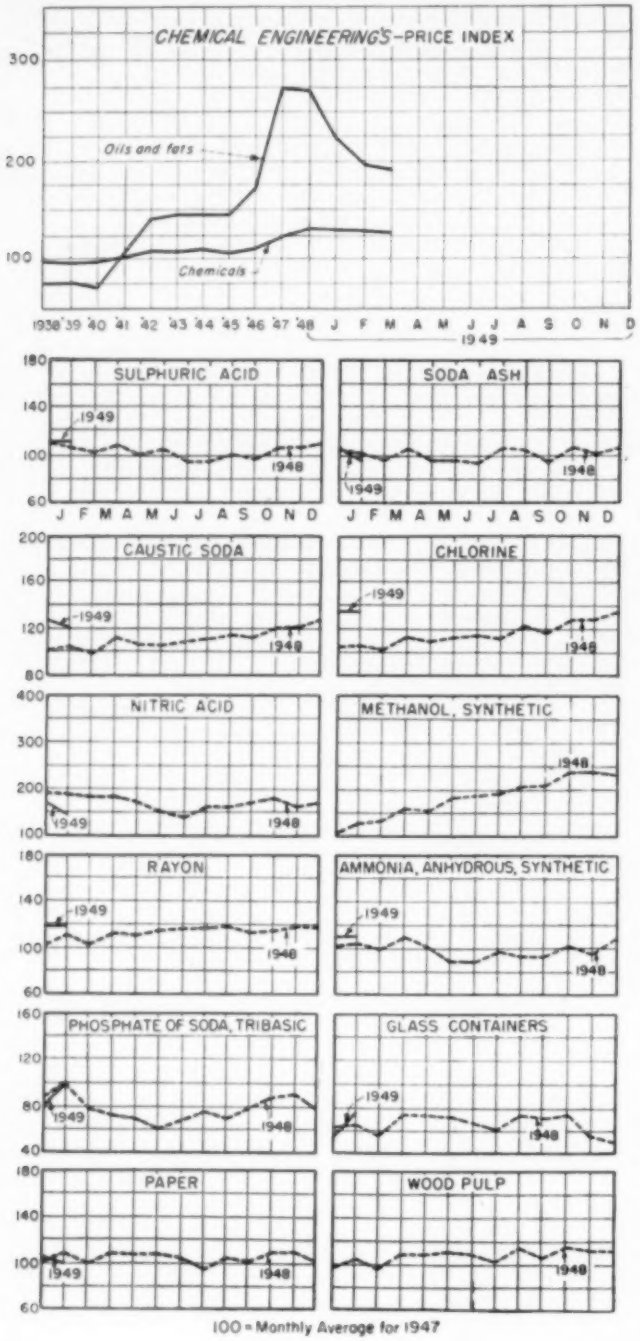
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PRODUCTION, CONSUMPTION AND PRICES TRENDS



100 = Monthly Average for 1947

Chemical Engineering

WEIGHTED INDEXES OF PRICES

Base = 100 for 1937

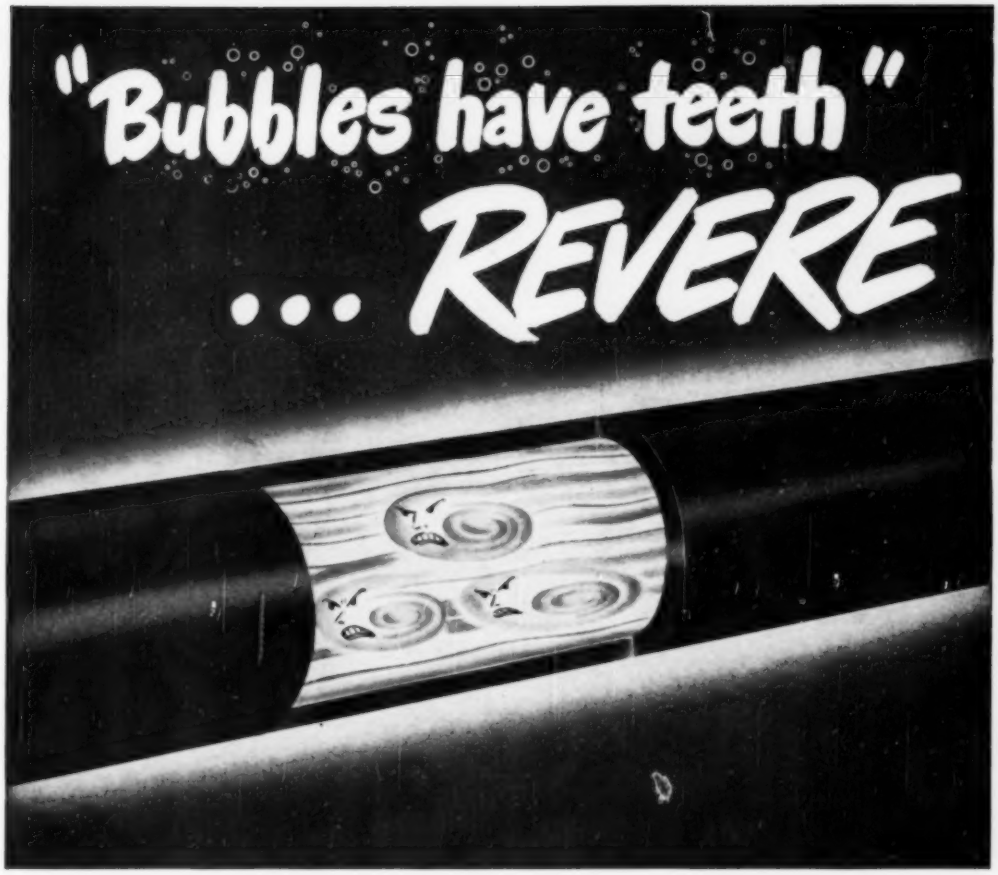
	Chemicals	Oils & Fats
As of April 1	126.06	163.61
Last Month	127.94	189.92
April 1948	129.84	263.42
April 1947	125.30	345.62

Data on production of inorganic chemicals in January have been issued by the Bureau of the Census and these figures show that over-all production was down from December levels. However, it was above January 1948 output. Soda ash output was off 8 percent from December and was also below the January 1948 production. Caustic soda production was 5 percent below the record December level of 221,479 short tons. However, it was far above the January 1948 output. Sulphuric acid produced in January amounted to 900,313 short tons. This is equivalant to an annual rate of production of 10,800,000 short tons. This is 575,000 tons above the 1948 consumption rate. All time peaks in sodium bichromate and chromate as well as disodium phosphate production were recorded in January.

There is good news for phosphate consumers this month. More phosphorous and chemical phosphates will be available when Westvaco Chemical Division of Food Machinery & Chemical Corp. completes a second phosphorus furnace at Pocatello, Idaho. Westvaco also is enlarging its phosphorus converting units at Carteret, N. J., and is erecting a new phosphate plant on the West Coast. All should be running by the first of the year.

PRICE TRENDS

Prices continued to move downward last month. Lead and lead pigments highlighted the drop. However, ethyl alcohol held firm in March. This was the first time in eight months that it has not fallen in price and there were some indications that it might start rising again. *Chemical Engineering's* weighted price index for chemicals slipped last month to 126.06. Fats & oils index tumbled 26 points to 163.61 by April 1.



SOME years ago Revere said that "Bubbles have teeth." It is still true. Air bubbles in a condenser can eat away at the tubes quite rapidly, and become a cause of failure with consequent re-tubing. Air-entrainment, as it is called, acts in several ways, all destructive to tubes. Air contains oxygen, which directly attacks most metals, forming oxides. Carbon dioxide in solution dissolves these oxides. That is not all. Air bubbles add to the erosion effect of turbulent flow. The higher the velocity, the worse the effect, and the more swift and serious is the combination of erosion and corrosion at points of greatest disturbance. Every effort should be made therefore to keep air from being carried into the cooling water. If you are troubled by frequent re-tubing of your condenser, get in touch with Revere, but first save a few samples from failed tubes for examination by our laboratories to determine the cause of failure. Many users of condenser tubes have found our collaboration exceedingly valuable, and we are always glad to cooperate in an effort to extend tube life.

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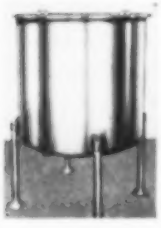


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United States Production of Certain Chemicals

December 1948, December 1947, and Twelve-Month Totals for 1948 and 1947

Chemical (Tons unless otherwise noted)	December 1948	December 1947	Total, Twelve Months 1948	Total, Twelve Months 1947
Ammonia, synthetic, anhydrous[1]	99,303	97,773	1,090,798	1,117,212
Ammonium nitrate	83,484	93,340	998,102	1,047,767
Ammonium sulphate, synthetic (M lb.)	32,256	37,346	390,878	394,053
Calcium arsenate (M lb.)		2,190		47,187
Calcium carbide, commercial	57,971	55,343	683,924	608,337
Calcium phosphate:				
Monobasic (M lb.)	6,004	6,262	72,529	71,734
Dibasic (M lb.)	10,770	7,982	86,175	77,537
Carbon dioxide:				
Liquid and gas (M lb.)	16,750	16,746	244,184	243,880
Solid (M lb.)	42,018	41,250	694,926	723,165
Chlorine	154,460	128,797	1,621,081	1,446,865
Chrome green (M lb.)	1,030	994	12,720	13,982
Chrome yellow and orange, (C.P.), (M lb.)	4,791	4,175	49,269	48,972
Hydrochloric acid	39,237	38,170	433,648	425,105
Hydrofluoric acid	5,089	5,073	62,455	55,182
Hydrogen (M cu. ft.)	2,578,000	2,288,000	27,941,000	21,936,000
Lead arsenate, acid and basic (M lb.)				30,187
Molybdate chrome orange, (C.P.), (M lb.)	342	495	5,594	4,456
Nitric acid	95,000	104,006	1,131,822	1,190,060
Oxygen (M cu. ft.)	1,409,000	1,251,000	15,948,000	13,793,000
Phosphoric acid (50 percent H_3PO_4)	109,449	90,412	1,116,449	1,038,414
Soda ash:				
Ammonia-soda process:				
Total wet and dry[2]	406,026	389,656	4,575,452	4,519,144
Finished light[3]	216,745	191,022	2,037,585	2,194,395
Finished dense	130,229	140,391	1,534,130	1,041,452
Natural[3]	22,681	24,394	297,495	281,133
Sodium bicarbonate, refined	13,810	14,684	160,925	181,145
Sodium bichromate and chromate	8,529	7,983	98,721	87,874
Sodium hydroxide:				
Electrolytic process:				
Liquid[4]	154,923	123,046	1,587,831	1,396,995
Solid	27,387	27,396	309,981	247,257
Lime-soda process:				
Liquid[4]	66,556	59,760	769,707	747,247
Solid	24,011	20,794	256,951	244,992
Sodium phosphate:				
Monobasic	1,330	1,221	11,344	14,214
Dibasic	9,663	6,740	86,455	83,340
Tribasic	6,802	7,496	80,198	89,053
Meta	2,677	2,153	35,045	20,666
Tetra	5,953	5,403	65,389	56,169
Sodium silicate, anhydrous	38,049	40,061	473,866	478,747
Sodium sulphate:				
Anhydrous	15,787	11,800	165,018	135,098
Glauber's salt[5]	13,064	17,042	183,399	197,963
Salt cake[5]	50,904	56,804	656,338	626,331
Sulphuric acid[6,7]				
Chamber process	249,480	297,330	2,973,218	3,325,887
Contact process, new	670,326	610,880	7,322,016	6,632,711

Data for this tabulation have been taken from "Facts for Industry" series issued by Bureau of the Census. Production figures represent primary production and do not include purchased or transferred materials. Quantities produced by government-owned arsenals, ordnance works, and certain plants operated for the government by private industry are not included. Chemicals manufactured by TVA, however, are included. All tons are 2,000 lb. Where no figures are given data are either confidential or not yet available. [1]Includes a small amount of aqua ammonia. [2]Total wet and dry production, including quantities diverted for manufacture of caustic soda and sodium bicarbonate, and quantities processed to finished light and finished dense. [3]Not including quantities converted to finished dense. [4]Data collected in cooperation with the Bureau of Mines. [5]Figures represent total production of liquid materials, including quantities evaporated to solid caustic and reported as such. [6]Includes oleum grades, excludes spent acid. [7]Data for sulphuric acid manufactured as a byproduct of smelting operations are included.

United States Production of Synthetic Organic Chemicals

December 1948, December 1947 and Twelve-Month Totals for 1948 and 1947

Chemical	December 1948	December 1947	Total, Twelve Months 1948	Total, Twelve Months 1947
Acetic acid:				
Synthetic	41,344,762	28,703,845	416,610,546	359,802,923
Recovered	135,382,903	138,789,415	1,548,372,304	1,459,137,384
Natural[1]	2,151,619	2,389,653	26,144,895	26,648,109
Acetic anhydride[2]	67,940,793	57,306,988	772,305,207	623,131,160
Acetone	47,308,034	33,617,535	490,060,427	396,466,995
Acetylsalicylic acid	1,112,749	614,610	9,762,853	11,964,505

(Continued on page 312)

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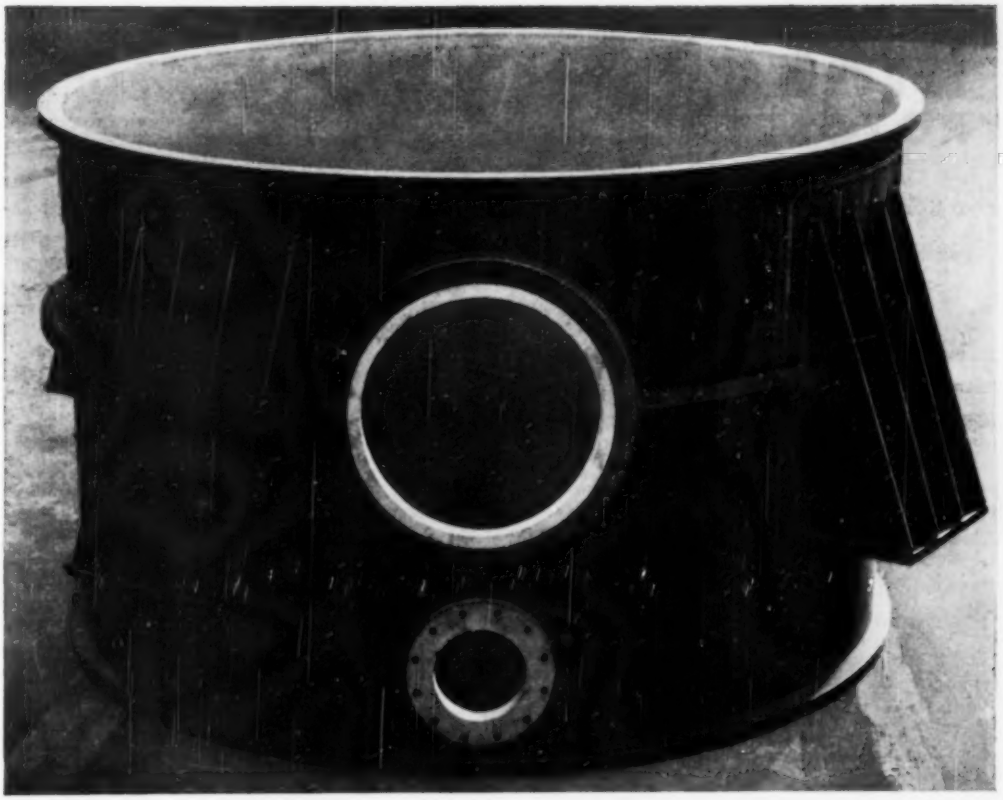
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U. S. Production of Synthetic Organic Chemicals, cont. from page 310

Chemical	December 1948	December 1947	Total, Twelve Months 1948	Total, Twelve Months 1947
Aniline	5,547,066	8,876,212	92,126,523	107,084,871
Barbituric acid derivatives:				
5-Ethyl-5-phenylbarbituric acid and salts (phenobarbital)	41,691	47,730	373,113	434,513
Benzene:				
Motor grade:				
Coke oven operators[6]	612,757	1,092,684	9,276,409	15,908,154
All other grades:				
Tar distillers[6]	1,021,415	2,233,693	12,100,501	21,871,398
Coke oven operators[6]	14,231,235	13,832,467	149,179,283	144,219,955
Butyl alcohol, primary, normal	14,021,644	9,992,987	140,484,938	138,816,908
Carbon bisulphide	37,567,527	31,263,951	408,158,286	386,379,020
Carbon tetrachloride	20,343,295	18,176,997	212,565,943	199,372,482
Chlorobenzene, mono	30,066,296	26,705,039	298,905,683	324,167,997
Creosote oil:				
Tar distillers[6]	10,684,353	11,004,472	111,491,240	122,241,102
Coke oven operators[6]	2,506,563	3,258,969	34,117,605	39,299,547
Cresols, meta-para[7]	851,704	612,626	9,204,718	6,459,035
Cresols, ortho-meta-para	687,739	635,491	9,342,089	8,721,377
Cresylic acid, refined[7,8]	2,189,460	2,094,170	26,356,850	25,948,560
Dibutyl phthalate	964,062	1,760,022	15,527,790	21,679,755
Dichlorodiphenyltrichlorethane (DDT)	3,109,039	2,617,458	18,346,727	47,474,937
Ethyl acetate (85 percent)	8,278,976	8,630,601	66,245,740	87,116,496
Ethylene glycol	16,589,720	24,953,234	262,236,790	226,678,939
Ethyl ether	3,205,330	3,632,271	36,091,187	41,213,616
Formaldehyde, 37 percent by wt	49,533,166	41,455,494	633,036,987	513,867,898
Hexachlorocyclohexane	1,074,920	1,279,964	15,765,410	7,467,490
Methanol, natural[9]	1,200,406	1,707,470	13,875,794	16,764,686
Methanol, synthetic	165,906,233	47,902,839	1,038,397,301	545,180,058
Naphthalene:				
Tar distillers, less than 79° C	18,853,781	16,019,157	210,835,588	219,578,940
Tar distillers, 79° C. and over	7,922,206	8,367,951	96,341,790	97,415,889
Coke-oven operators, less than 79° C	9,648,624	6,852,835	101,263,367	96,664,886
Penicillin and salts[10]	9,270,206	5,804,761	95,142,208	41,426,252
Phenol	27,911,837	28,144,341	293,655,984	288,469,196
Phthalic anhydride	15,873,897	12,892,589	159,908,584	140,981,126
Styrene, government and private plant	33,422,297	29,726,895	377,406,647	310,157,481
Toluene:				
Coke-oven operators	2,575,480	2,700,909	28,600,138	27,356,991
All other[11]	3,581,008	3,126,022	44,567,713	36,905,722
Xylene, crude	5,735,126	4,039,772	60,715,228	40,432,075

All data in pounds except benzene (gal.) creosote oil (gal.), toluene (gal.) xylene (gal.) and penicillin (million Oxford units). Statistics collected and compiled by U. S. Tariff Commission except where noted. Absence of data on production indicates either that returns were unavailable or confidential. [1]Excludes the statistics on recovered acid. [2]Acid produced by direct process from wood and from calcium acetate. [3]All acetic anhydride including that from acetic by vapor-phase process. [4]Product of distillers who use purchased coal tar only or from oil-gas or water-gas produced or purchased by tar distillers. [5]Statistics are given in terms of bulk medicinals only. [6]Statistics collected by Bureau of Mines. [7]Total production including data reported both by coke-oven operators and by distillers of purchased coal tar. [8]Reported to U. S. Bureau of the Census. [9]Includes toluene produced from petroleum by any process. [10]Includes refined cresylic acid from petroleum.

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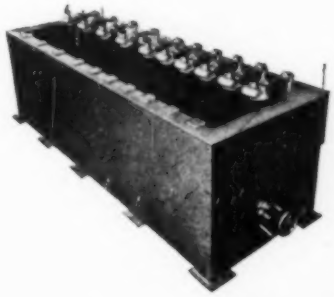


HAPMAN CONVEYORS, Inc. 2405 West McNichols Detroit 21, Michigan

Your request for a copy of our new catalog insert, describing the Hapman Cable-Veyor in detail, will bring it by return mail.

How Long will it take to pay $ for new equipment...

if you can save up to 40% in your solution heating?



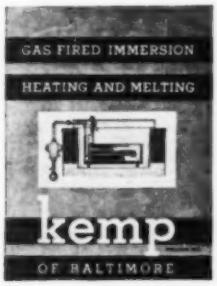
10-Burner Kemp Immersion Heating Pot, with Drain Valve for heated material change from time to time.

When you figure that out... it often happens that you find Kemp Immersion Heating equipment will pay for itself in 2 years or less.

That's the record for many users of Kemp equipment!

But first—to complete your data—you'll have to know what Kemp equipment costs. That's where the Kemp representative can help. There is one near you... a qualified engineer... and a word to us will bring him at your convenience.

Or perhaps, you'd like to see our interesting illustrated booklet on Immersion Heating for industry. Yours, too, for the asking.



The C. M. Kemp Manufacturing Co.
405 East Oliver Street
Baltimore 2, Maryland

☐ Please send me your NEW Bulletin No. IE-11 on Immersion Heating.

☐ Please send a Kemp representative in to see me.

Name.....

Company.....

Street.....

City..... Zone.....

State.....

HCE-4

KEMP of BALTIMORE

The C. M. KEMP Manufacturing Co.
405 East Oliver St., Baltimore 2, Md.

PRECISION CARBURETORS • BURNERS FOR INDUSTRIAL HEAT CONTROL • FIRE-CHECKS AND OTHER SAFETY DEVICES
ATMOSPHERE GENERATORS • INERT GAS PRODUCERS • ADSORPTIVE DRYER SYSTEMS FOR PROCESS CONTROL

New Construction

	Current Projects		Cumulative 1949	
	Proposed Work	Contracts	Proposed Work	Contracts
New England	$136,000	$138,000	$206,000	$1,056,000
Middle Atlantic	5,408,000	492,000	158,233,000	3,032,000
South		11,250,000	2,243,000	19,031,000
Middle West	136,000	15,636,000	10,654,000	19,726,000
West of Mississippi	6,168,000	11,368,000	33,593,000	26,251,000
Far West	1,700,000		3,825,000	1,190,000
Canada	2,450,000	1,000,000	17,465,000	12,600,000
Total	$15,998,000	$39,884,000	$226,219,000	$82,886,000

Proposed Work

Ark., Jonesboro—Little Giant Glass Co., M. E. McSwain, Pres., Jonesboro, plans to construct additions to its plant to include a 90x225 ft. factory building.

Ark., North Little Rock—Arkansas Farm Bureau Cooperative, c/o Joe Hardin, Grady, Ark., plans to construct a fertilizer factory here. Utility Sales & Engineering Co., Atlanta, Ga., Archt. Estimated cost $600,000.

Calif., Torrance—Pittsburgh Plate Glass Co., 7412 Male Ave., Los Angeles, plans to construct a factory here. A. C. Martin & Assoc., 333 South Beaudry St., Los Angeles, Archts. Estimated cost $1,700,000.

Ill., Chicago—Sherwin-Williams Co., 300 West Lake St., plans to construct a 3 story pilot building. Schmidt, Garden & Erikson, 104 South Michigan Ave., Archts.

Kans., Kansas City—Colgate-Palmolive-Peet Co., 105 Hudson St., Jersey City, N. J., plans to construct a plant here. Estimated cost will exceed $2,000,000.

Me., Eastport—Argenta Products Co., Eastport, manufacture of fire foam, pearl essence and fish glue, plans to rebuild its plant here recently destroyed by fire. Estimated cost $68,000.

Mass., Chelsea—Pinco Rubber Co., 31 Highland St., plans to construct a warehouse. Estimated cost will exceed $68,000.

N. J., Clifton—Yardley of London, Ltd., 620 Fifth Ave., New York 20, N. Y., has acquired an 11 acre tract in the Allwood Section and plans to construct a factory. Estimated cost $1,500,000.

N. Y., New York—S & S Soap Co., 324-30 Barrett St., plans to construct a 2½ story, 95x200 ft. soap factory on the north side of East 135th St., east of Willow Ave. Joshua Tabatchnik, 16 Court St., Brooklyn 2, Archt. Estimated cost $320,000.

O., Lisbon—Hood Chemical Co., 233 Oliver Way, Pittsburgh, Pa., plans to construct a factory to replace the one recently destroyed by fire.

Pa., Lancaster—Armstrong Cork Co., Liberty and Mary Sts., plans to construct a research laboratory. Shreve, Lamb & Harmon Associates, 11 East 44th St., New York, N. Y., Archts. Estimated cost $3,500,000.

Pa., Philadelphia—Sinclair Refining Co., 10 West 51st St., New York, N. Y., plans to construct a 1 story factory. Estimated cost will exceed $68,000.

Tex., Falfurrias—United Carbon Co., c/o J. R. Alexander, Odessa, Tex., plans to construct a carbon black plant in this area. Estimated cost $1,000,000.

Tex., Karnes City—United Gas Corp., Fairfield Ave., Shreveport, La., has purchased an 80 acre site here and plans to construct a gasoline plant. Estimated cost $2,000,000.

Tex., Stinnett—Stacy-Dresser Engineering Div. of Dresser Interests, 1900 Superior Ave., Cleveland, O., plans to construct a desulfo plant here. Estimated cost $500,000.

Alta., Calgary—Western Gypsum, Ltd., 26th Ave. and 11th St., E., plans to construct a perlite processing plant in East Calgary. Estimated cost $100,000.

B. C., Deep Bay—R. C. Cement Co., Ltd., Deep Bay, plans to construct a plant here. Estimated cost $500,000.

B. C., Quesnee—Bowater, Ltd., St. John's, Newfoundland, plans to construct a pulp mill here. Estimated cost $1,000,000.

Que., St. Lambert—Eugene Gagnon Assoc., c/o Dept. of Mines, Quebec City, plan to construct a plant for the manufacture of vitrolite. Estimated cost $100,000.

Que., Sherbrooke—Eugene Gagnow Assoc., c/o Dept. of Mines, Quebec City, plans to develop 400 acre property of "Patronite" deposits and construct plant for the manufacture of firebrick, brake linings, etc. Estimated cost $750,000.

Contracts Awarded

Ala., Mobile—Hollingsworth & Whitney Co., Magazine Point, Mobile, has awarded the contract for expanding its paper mill to Rust Engineering Co., Exchange Bldg., Birmingham. Estimated cost $10,500,000.

Conn., West Haven—Armstrong Rubber Co., 475 Elm St., has awarded the contract for a 2 story, 60x100 ft. factory to Edwin Moss & Son, Inc., 535 Grant St., Bridgeport. Estimated cost $70,000.

Ill., Chicago—Chicago Carton Co., 4200 South Pulaski St., has awarded the contract for substructure for four 1 and 2 story factory buildings to Carl E. Erickson Co., 4657 West Ravenswood St.

Ill., Chicago—City Glass Co., 3018 South Wabash St., has awarded the contract for a 1 story, 108x135 ft. warehouse to Robt. Construction Co., 1009 North Wells St.

Ill., Chicago—DeMert & Dougherty, 3001 West 47th St., manufacturers of turpentine, rosins and other naval stores, have awarded the contract for a 2 story factory to W. E. Boyington, 1625 West 75th Pl., Chicago. Estimated cost $400,000.

Ill., East St. Louis—Soya Feed & Oil Corp., 422 South Front St., has awarded the contract for the construction of three 2 story factory buildings and steel storage tanks to Chemical Plants Div. of Blaw-Knox Co., 221 Pennsylvania Ave., Pittsburgh. Estimated cost $800,000.

Ill., Lockport—The Texas Co., 332 South Michigan Ave., Chicago, Ill., has awarded the contract for refinery extensions, additions to storage tanks and utility buildings to Chicago Bridge & Iron Works, 332 South Michigan Ave., Chicago. Gravel Tank & Mfg. Co., 4809 Todd St., East Chicago, Ind., Hansen & Peterson Co., Joliet and Henry B. Ogren & Sons, Lockport. Estimated cost $1,000,000.

Ind., Indianapolis—Glidden Co., 1160 West 18th St., has awarded the contract for a soybean extraction plant to Chemical Plants Div. of Blaw-Knox Co., 221 Pennsylvania Ave., Pittsburgh, Pa. Estimated cost $3,000,000.

Mo., St. Louis—Mississippi Glass Co., 88 Angelica St., St. Louis 7, has awarded the contract for a silo to Pruin-Colnon Contracting Co., 1706 Olive St.

N. J., Linden—Merck & Co., 126 East Lincoln Ave., has awarded the contract for an organic chemical manufacturing plant to Walter Kidde Constructors, Inc., 140 Cedar St., New York 6, N. Y. Estimated cost $354,000.

N. C., Wilmington—Lloyd A. Fry Roofing Co., 5818 South Archer St., Chicago, Ill., has awarded the contract for the construction of a plant for the manufacture of asphalt composition roofing to Campbell, Lowrie, Lautermilch Co., 400 West Madison St., Chicago, Ill. Estimated cost $750,000.

O., Ashtabula—National Distillers Chemical Corp., 120 Broadway, New York, N. Y., has awarded the contract for the design and construction of a chemical plant to produce metallic sodium and chlorine, on a 55 acre site on State Rd., to Sanderson & Porter, 52 William St., New York, N. Y. Estimated cost $10,000,000.

O., Cincinnati—Abbott Laboratories, Sheridan at 14th St., N., Chicago, Ill., have awarded the contract for a laboratory and office building to Penker Construction Co., 1030 Summer St. Estimated cost $300,000.

Okla., Marlow—Magnolia Petroleum Co. & Assoc., Magnolia Bldg., Dallas, Tex., have awarded the contract for a natural gasoline plant in Sholem Alechem Field to Jones & Laughlin Supply Co., 108 North Trenton St., Tulsa. Estimated cost $3,500,000.

Okla., Tussy—Magnolia Petroleum Co., Magnolia Bldg., Dallas, Tex., has awarded the contract for a gasoline plant to Jones & Laughlin, Thompson Bldg., Tulsa. Estimated cost $600,000.

Pa., Philadelphia—Abbott's Laboratories, 31st and Chestnut Sts., will construct a laboratory building. Work will be done by separate contracts. Estimated cost will exceed $68,000.

Pa., Philadelphia—General Electric Co., 6901 Elmwood Ave., has awarded the contract for design and construction of a laboratory to United Engineers & Constructors, Inc., 1401 Arch St. Estimated cost will exceed $70,000.

R. I., Warren—Anchorage Plastic Corp., 37 Miller St., will construct a plastic manufacturing plant. Work will be done by owners. Estimated cost $68,000.

Tex., Borger—Phillips Petroleum Co., Borger, will reconstruct its refinery unit. Work will be done by owners. Estimated cost $100,000.

Tex., Falfurrias—LaGloria Corp., Driscoll Bldg., Corpus Christi, has awarded the contract for a 4,800 hp. compressor plant to have a daily capacity of 30,000,000 cu. ft. casinghead gas, to Hudson Engineering Corp., 2711 Danville St., Houston. Estimated cost $475,000.

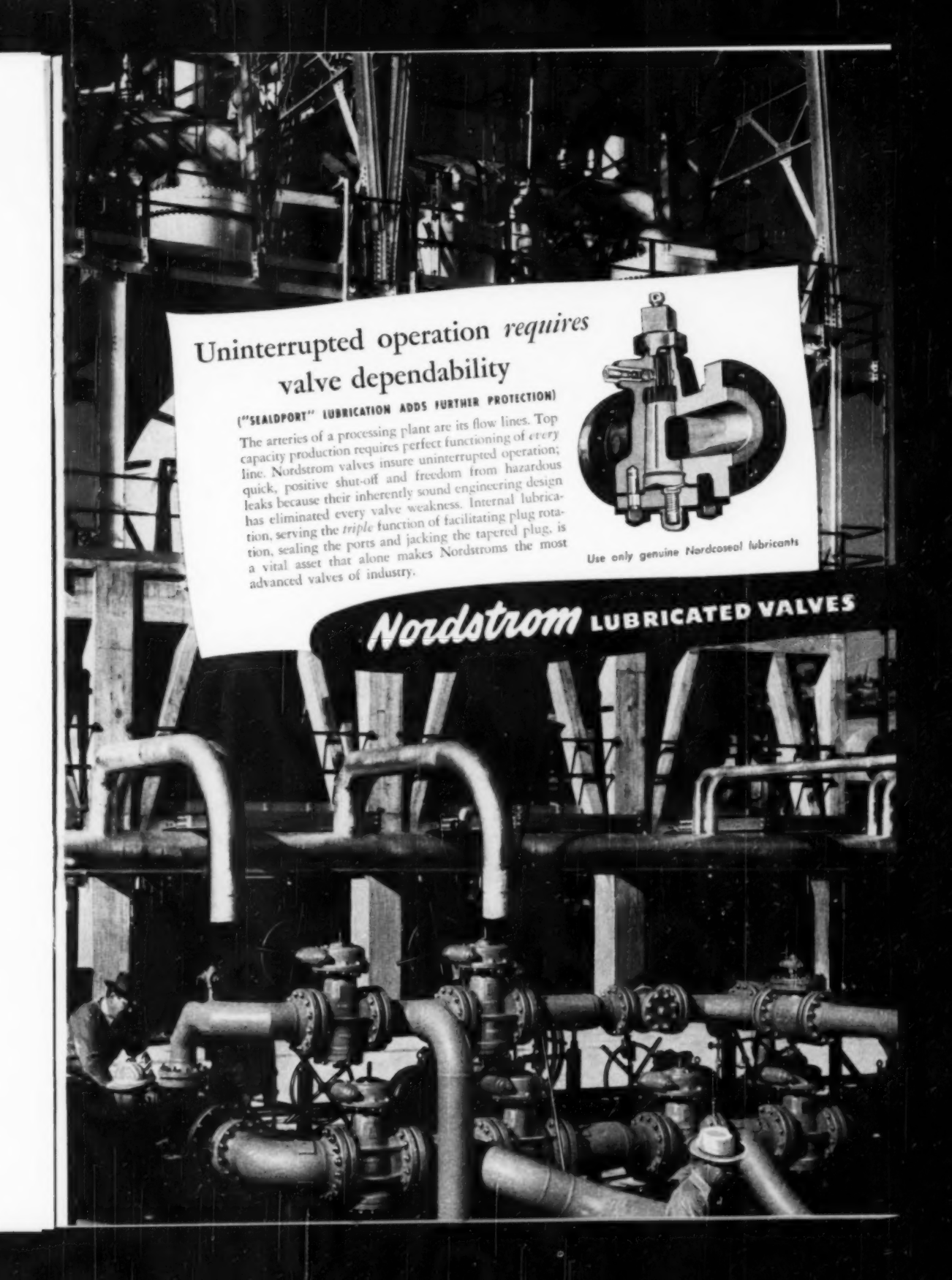
Tex., Grand Saline—Morton Salt Co., Grand Saline, has awarded the contract for the design and construction of new plant buildings and additions to H. K. Ferguson Co., 1783 East 11th St., Cleveland, O. Estimated cost $2,000,000.

Tex., Port Arthur—Gulf Oil Corp., Port Arthur, will construct new topping stills. Work will be done by purchase and hire. Estimated cost $5,500,000.

Tex., Robert Lee—Sun Oil Co., M. Esperson Bldg., will construct a flare gas recycling plant. Work will be done with own forces. Estimated cost $2,000,000.

Tex., Waco—General Tire & Rubber Co., 1708 East Market St., Akron, O., will enlarge its plant. Work will be done with own forces. Estimated cost $125,000.

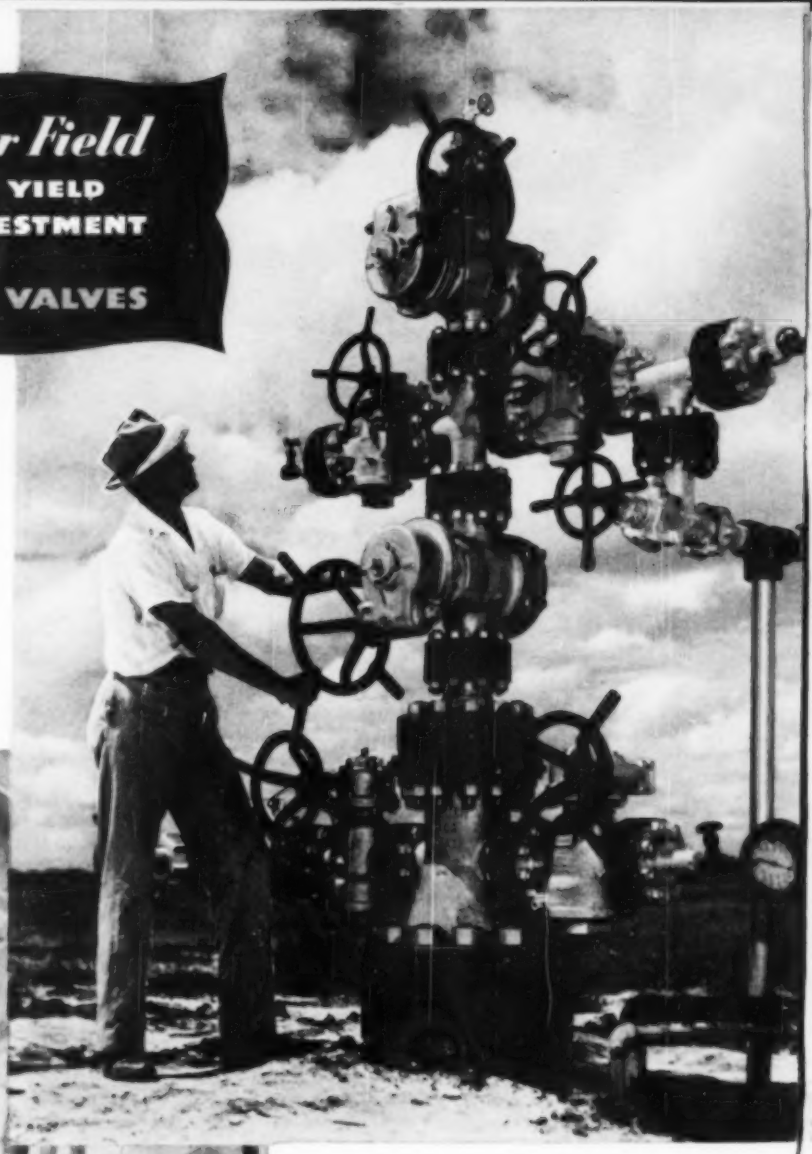
Que., Montreal East (Montreal P. O.)—Shell Oil Co., Ltd., 660 St. Catherine St., W., Montreal, has awarded the contract for a refinery to A. O. McKee & Co., 2300 Chester St., Cleveland, O., and Fluor Corp. of Canada, Ltd., Montreal. Estimated cost will exceed $1,000,000.


Uninterrupted operation *requires* valve dependability
("SEALDPORT" LUBRICATION ADDS FURTHER PROTECTION)
The arteries of a processing plant are its flow lines. Top capacity production requires perfect functioning of *every* line. Nordstrom valves insure uninterrupted operation; quick, positive shut-off and freedom from hazardous leaks because their inherently sound engineering design has eliminated every valve weakness. Internal lubrication, serving the *triple* function of facilitating plug rotation, sealing the ports and jacking the tapered plug, is a vital asset that alone makes Nordstroms the most advanced valves of industry.
Use only genuine Nordcoseal lubricants
Nordstrom LUBRICATED VALVES

In Plant or Field

A GREATER YIELD ON VALVE INVESTMENT WITH NORDSTROM VALVES

Valves are a major investment. Their true cost must be based on performance and lifetime endurance. Cost-minded engineers are specifying Nordstroms because these valves yield more service per dollar invested; there is an appreciable saving in man-hours; and greatest convenience in operation.





Nordstrom simplicity provides a valve with few parts. All standard specifications are met. A complete range of sizes, pressures and types permits selection of practically custom-made valves for each specific application. Nordstrom engineering service at plant and in the field is of highest caliber, offering experienced counsel in valve selection.

KEEP UPKEEP DOWN

Use only genuine Nordcoseal lubricants

Nordstrom

VALVE DIVISION

Rockwell Manufacturing Co.

400 N. Lexington Ave., Pittsburgh 8, Pa.

Sales Offices in principal cities. Export: Rockwell International Corporation, 7701 Empire State Bldg., New York 1, N. Y.

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Here is the Diaphragm Motor Valve Body

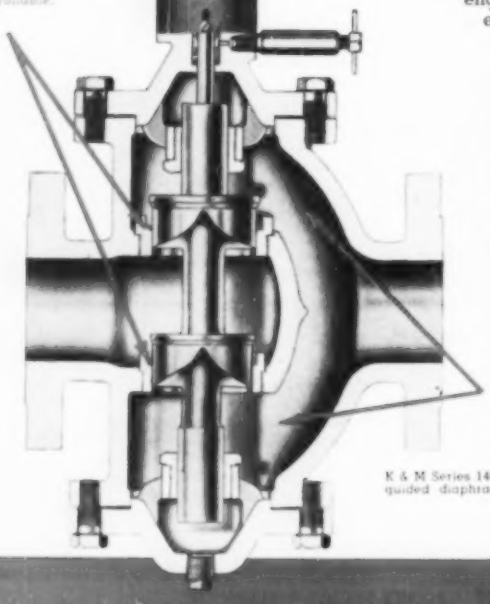
DESIGNED ESPECIALLY FOR INSTRUMENTATION

K & M Kontrol Motor valve bodies are especially designed to assure close and positive control by instrumentation. They have unrestricted inlet and discharge passages and permit smooth flow with a minimum of turbulence. Pressure drop is held to a minimum and occurs principally through the inner valve where it is controllable through the full valve travel.

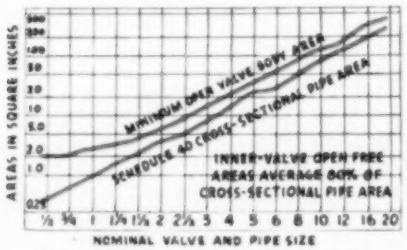
Kontrol Motor valve bodies are available in sizes from ½- to 20-inch, complete with diaphragm top works, and are made in 13 different types to meet varying requirements. Constructed of semi-steel, bronze, cast steel or special alloys.

Inner valves in beveled quick opening, percentage parabolic or percentage V-port design as standard. Facings range from soft rubber to hard stellite. Designed and manufactured for modern industry, they are engineered throughout to stand up to the most exacting applications.

Pressure drop occurs principally through the inner valve where it is controllable.



K & M Series 1400 top and bottom guided diaphragm motor valve



Because of their modern design, all Kontrol Motor valve bodies have extremely high capacities in relation to corresponding pipe size.

Over size, streamlined body areas reduce turbulence and friction to a minimum and assure smooth, maximum flow.



KONTROL MOTOR

NORTH BERGEN, N. J.

ESTABLISHED 1879

This extremely accurate circular, slide-rule type K & M valve capacity calculator includes correction scales for steam quality, liquid and gas specific gravity and a flowing temperature scale for steam. Sent without charge in response to a request on your business stationery.

STANDARD OIL COMPANY (Indiana)
keeps its products pure
-in drums equipped with Tri-Sure Closures

INDOPOL Polybutenes produced by Standard Oil Company (Indiana), and marketed by their subsidiary, the Indoil Chemical Company, are made for such exacting uses that it is imperative that they be kept absolutely free from impurities. So Standard of Indiana plays safe — takes no chances with seepage, dust or tampering — by equipping every drum with Tri-Sure Closures*.

For over 10 years, Standard Oil Company (Indiana) has given its fine line of chemical and petroleum products the protection of Tri-Sure Closures — to *maintain* the purity of its products from the plant to the purchaser. And, like other leading shippers, they rely on *Tri-Sure* protection because the Tri-Sure FLANGE is an integral part of the drum, as strong as the drum itself . . . the Tri-Sure PLUG screws securely into the flange to effect a tight closing . . . the Tri-Sure heavy-gauge SEAL, with cork gasket, provides a leakage-proof covering which cannot be removed unless it is deliberately destroyed.

Play Safe by Specifying "Tri-Sure Closures" on Every Drum Order

*The "Tri-Sure" trademark is a mark of reliability backed by 26 years serving industry. It tells your customers that genuine Tri-Sure flanges (inserted with genuine Tri-Sure dies), plugs and seals have been used.

TURBINE OILS

TRANSFORMER OILS

MOTOR OILS

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FINE CHEMICALS

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†Reg. U. S. Pat. Off.



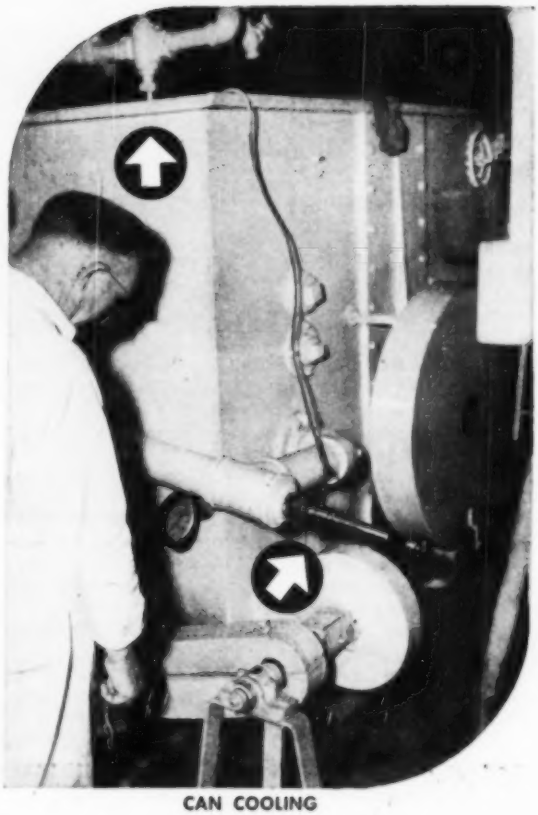
AMERICAN FLANGE & MANUFACTURING CO. INC.
30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

TRI-SURE PRODUCTS LIMITED, ST. CATHARINES, ONTARIO, CANADA

Tri-Sure
Reg. U.S. Pat. Off.
CLOSURES

HOW SARCO SAVES WATER

This can cooler handles 40 No. 10 tins of chocolate and cooked foods per minute. The water temperature must never exceed sixty degrees, but the load and the incoming water temperatures vary. The simple hook-up of a Sarco TR-21 regulator holds the tank water within the required limits, day after day, without supervision. The water saving alone paid for the change in a few months and can cooling is now automatically uniform.

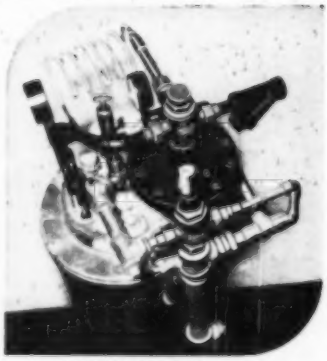


CAN COOLING

Each oil cooling system on a battery of plastic presses required a full stream of city water—a six inch pipe running wild at $500 a month for the plant. Sarco Control reduced the stream to a trickle and the entire battery and all air compressors are being Sarco equipped with a total saving estimated at $300 a month. Ask for Catalog No. 700.

●

You also can save hot water with Sarco by having temperatures correct at all times. The Instantaneous Water Heater shown at the right has two Sarco Controls, one for the hot water and one for blended water. Catalog No. 600.



WATER HEATER

230

SARCO
SAVES STEAM

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Controlled Quality

safeguards performance

OF EVERY LADISH

SEAMLESS WELDING FITTING



Spectrographic analysis is but one of many Controlled Quality tests conducted by the Ladish Metallurgical Laboratory.



Unsurpassed metallurgical standards . . . are important safeguards by which Controlled Quality assures Ladish fittings of maximum physical properties necessary for peak performance . . . extra protection that you value more with each added year of reliable service.

TO MARK PROGRESS

A COMPLETE LINE PRODUCED UNDER ONE ROOF
. . . ONE RESPONSIBILITY



LADISH CO.

CUDAHY, WISCONSIN

MILWAUKEE SUBURB

DISTRICT OFFICES: New York • Buffalo • Pittsburgh • Philadelphia
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every piping system deserves the protection of Controlled Quality fittings

Shown here is one view in the spotless modern plant where Swift's Animal Protein Colloid is made. Operation is continuous, automatic . . . the product is "untouched by human hands," not contaminated by foreign substances.



Investigate this Modern Process Agent:

Swift's Animal Protein Colloid*

(made from an exclusive Swift Process)

Does your manufacturing process require . . .

1. An emulsifier?
2. A flotation agent?
3. A gel structure?
4. A settling agent?
5. A protective coating?
6. A sizing agent?
7. A carrier of pigments?
8. An impregnating agent?
9. A base for pigment?
10. An oilproofing agent?
11. A flocculating agent?
12. A clarifying agent?
13. A filtering agent?
14. A stiffening agent?
15. A mordant?

This modern process agent, Swift's refined Animal Protein Colloid, has properties which may be employed in a wide number of processes. Even though you have used other processing agents, be sure you investigate Swift's Animal Protein Colloid now. It has unusual properties. It may meet the requirements of your present operations or help in developing new ones.

What is this modern process agent?

Swift's Animal Protein Colloid is made by an exclusive Swift process. Protein liquor is extracted from bones and highly concentrated. This pure liquid falls on a bed of dry finished product which adheres evenly to the droplets. Then, by continuous and automatic schedule, these droplets travel through driers and are milled and screened. This whole operation is under *precise synchronized control* and is completed in relatively short time.

The result is a uniform granular form that goes into solution rapidly. It's a purified product, light amber in color.

Because plant and machinery are kept spotlessly clean — the finished product does not touch material which can contaminate it with foreign substances . . . because of the precise control possible with Swift's exclusive process, Swift can bring you this *superior* processing agent. And Swift's Animal Protein Colloid has the same high quality and uniform characteristics the year 'round.

Swift's technical service yours, investigate now

Write or phone for one of Swift's special representatives. He will call and discuss Swift's Animal Protein Colloid with you. This process agent may be just what you are looking for. Write to:

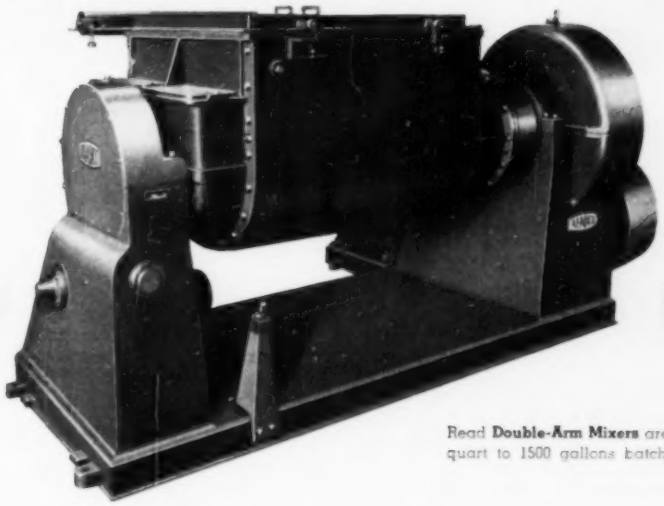
Swift & Company

ADHESIVE PRODUCTS DEPARTMENT

4105 Packers Avenue, Chicago 9, Illinois

*Commercially high quality bone glue.

Read the Facts about READ Chemical Equipment



Read **Double-Arm Mixers** are built in 1 quart to 1500 gallons batch capacity.

OVERLAPPING SIGMA BLADE ACTION means shorter mixing cycle with lower peak loads

IN MIXERS, speeding up the mixing cycle and minimizing peak loads are definite advantages. The overlapping Sigma Blade action of Read Double-Arm Mixers accomplishes just that. Formation of cylinders of material about the arms is avoided. They handle even the heaviest viscous materials with an ease and smoothness that is remarkable.

READ Double-Arm Mixer Advantages:

- One-piece base, to insure permanent alignment and rigidity.
- Mixing chamber accurately machined on the double arc bottom to insure close clearance with the machined arms.
- Vacuum mixer has single packing gland construction which eliminates the possibility of contamination or oxidation.
- Baffled jackets for efficient and even temperature control.
- Heavy-duty construction: built of common metal or any commercial alloy; available with or without jackets, and of the vacuum or non-vacuum design.
- Single, multi, or variable speed motors for plastic processes.

BRING YOUR MIXING PROBLEMS TO READ

MAKERS OF READCO CHEMICAL EQUIPMENT

WHAT'S YOUR NEED?

CALL ON . . .

READ MACHINERY DIVISION

of THE STANDARD STOKER COMPANY, INC.
YORK, PENNSYLVANIA

Write for literature and specifications on **Read Mixers.**

New Tube-Type Fan-Cooled

THE NEW ALLIS-CHALMERS tube-type totally-enclosed fan-cooled motor reduces maintenance to a point never before reached in totally-enclosed design.

This saving is made possible by the unique method of cooling. Straight tubes, running parallel to the shaft, surround the stator core. Internal fans circulate air within the motor to transfer heat to the tubes. An external fan moves outside air through the tubes to remove heat quickly and effectively. This heat exchanger is so efficient that the new Allis-Chalmers tube-type motor is only slightly larger than an open motor of the same rating.

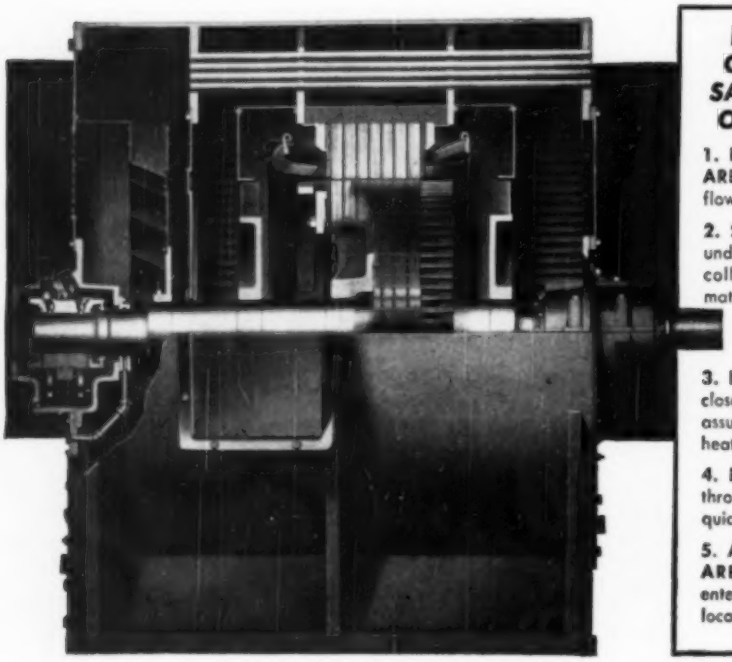
MAINTENANCE MATERIALLY REDUCED

The new Allis-Chalmers tube-type motor is practically self-cleaning because the tubes are straight, the air passages unrestricted, and the cooling air flows at sufficient speed to carry foreign matter out with it. Should unusually dirty air conditions make cleaning desirable, tubes can be swabbed out quickly and easily. Since all electrical parts are enclosed, this new motor can be installed indoors or out in any atmosphere.

COOLING EFFICIENCY PROVED

Three years of successful operation in the field have proved that the new Allis-Chalmers tube-type, totally-enclosed, fan-cooled motor can bring important savings to any industry faced with high motor maintenance costs due to dirty, corrosive or hazardous operating conditions. For information on this new motor contact your nearest A-C district office or write for bulletins 05B7150 and 51R7149.

ALLIS-CHALMERS, 1147A SO. 70 ST.
MILWAUKEE, WIS.



HOW TUBE-TYPE COOLING SYSTEM SAVES YOU MONEY ON MAINTENANCE

1. LARGE HEAT TRANSFER AREA of tubes plus efficient air flow removes heat quickly.

2. STRAIGHT TUBES do not, under normal conditions, clog or collect moisture and foreign matter.

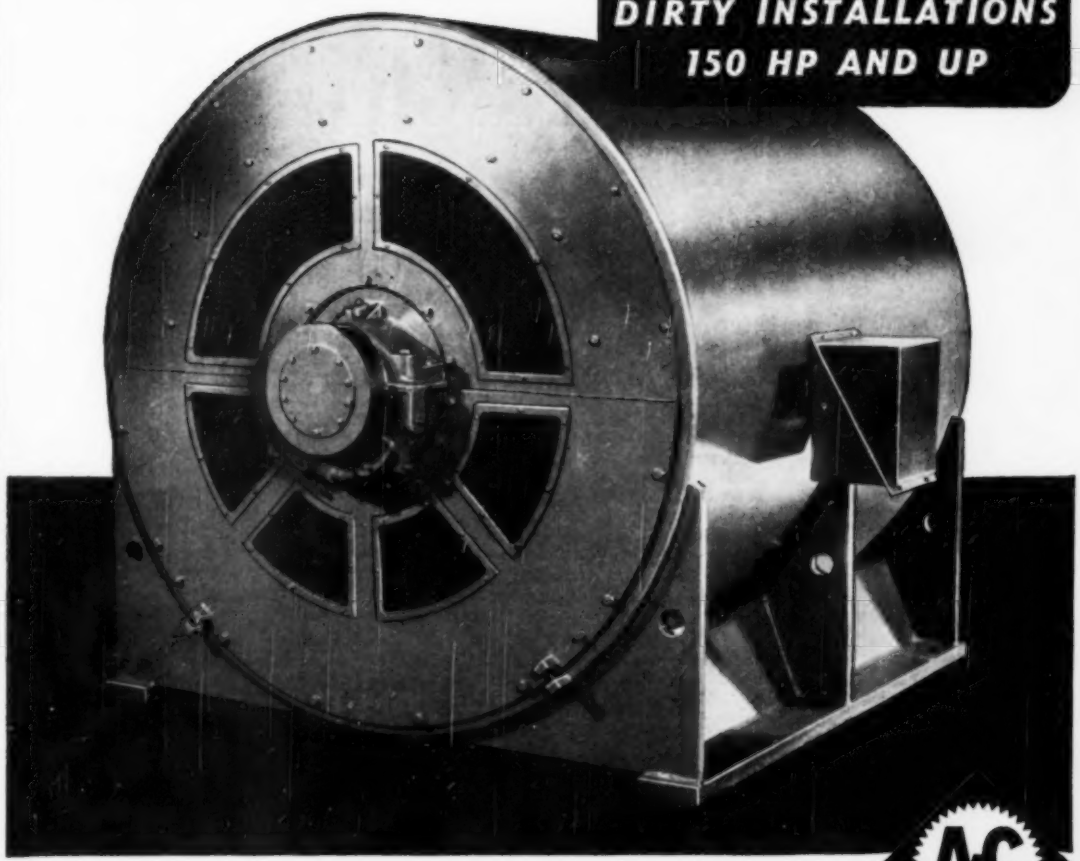
3. INTERNAL FANS keep enclosed air constantly circulating, assuring even cooling and fast heat dispersal.

4. EXTERNAL FAN blows air through tubes to remove heat quickly and efficiently.

5. ALL ELECTRICAL PARTS ARE ENCLOSED. Dirt cannot enter. May be installed in any location, indoors or out.

Totally-Enclosed Motors!

MAINTENANCE CUT SHARPLY ON OUTDOOR, CORROSIVE AND DIRTY INSTALLATIONS 150 HP AND UP



A-C ALLIS-CHALMERS

ALLIS-CHALMERS

A 2643

Pioneers in Power and Electrical Equipment From Generation Through Utilization

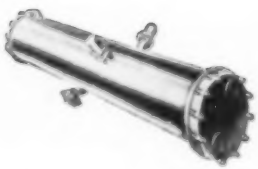
WESTINGHOUSE ANNOUNCES THE NEW ALL-ALUMINUM PRECIPITRON*... MOST EFFICIENT AIR CLEANER EVER BUILT

Now PRECIPITRON is more effective than ever!* Introduced more than ten years ago by Westinghouse, PRECIPITRON*, the electronic air cleaner, has opened important new avenues of cost reduction for business and industry. For only the PRECIPITRON* principle eliminates up to 90% of all airborne dirt, smoke, dust, soot and industrial oil mists, compared to the 10% to 20% efficiencies of ordinary mechanical filters.

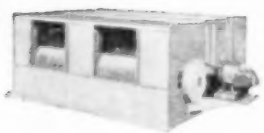
The new, all-aluminum PRECIPITRON* cell now offers more advantages that mean additional savings—

1. **25% More Plate Area Per Cell.** Means lower costs for cleaning a given volume of air. For, each PRECIPITRON* Dust Collector Cell has 25% more collection area than before. This permits more compact installation with resultant savings in space and equipment.
2. **All-Aluminum Construction.** Means lower maintenance and installation costs. For, as the only electronic air

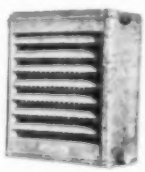
*Reg. U. S. Pat. Off.



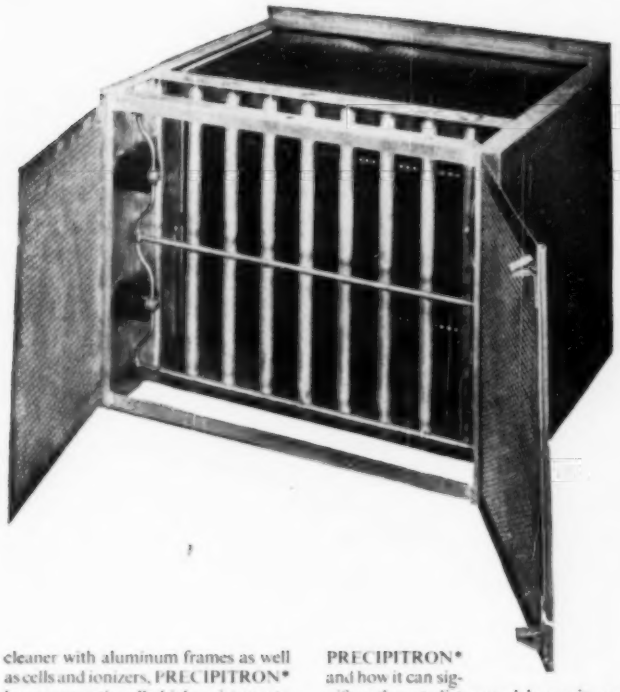
REFRIGERATION CONDENSERS



AIR HANDLING UNITS



UNIT HEATERS



25% MORE PLATE AREA per cell

cleaner with aluminum frames as well as cells and ionizers, PRECIPITRON* has an exceptionally high resistance to corrosion and rust—needs no protective coating. And, there's not a single part—with exception of power pack—which cannot be handled by one man without auxiliary lifting devices. Heaviest piece weighs only 50 lbs. So, PRECIPITRON* is assembled quickly, easily—with resultant savings in labor costs.

For more information on this new PRECIPITRON* and how it can significantly cut dirt-caused losses in *your* business or industrial operations, call your nearest Westinghouse office. Or, write to Westinghouse Electric Corporation, Sturtevant Division, Hyde Park, Boston 36, Massachusetts.

Westinghouse
Sturtevant Division



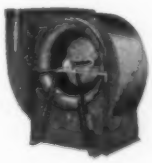
REFRIGERATION COMPRESSORS



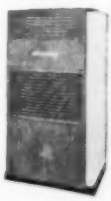
AXIAL FLOW FANS



HEATING AND COOLING COILS



CENTRIFUGAL FANS



UNIT AIR CONDITIONERS



SURFACE DEHUMIDIFIERS

Everything that puts air to work for Every application

J-80134

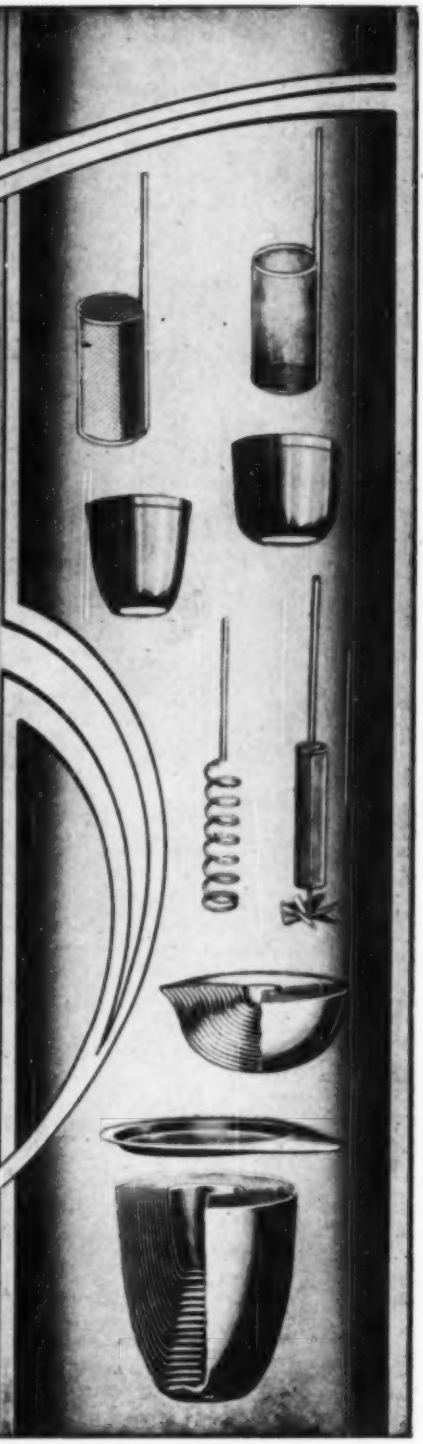
BAKER Platinum Laboratory Ware

Tested by Use

We have been manufacturing platinum laboratory ware for almost three quarters of a century and during that period have done much to bring this ware to its present exactness and high state of development. We introduced platinum-rhodium alloy laboratory ware, which is now so highly regarded, and such design changes as our reinforced rim crucibles and dishes and the Baker Low Form Crucible.

Because, naturally, our large scientific laboratories use apparatus manufactured by us in their own work, Baker Laboratory Ware is constantly subjected to continuous tests through use and so we are enabled to detect the need for improvements. An example was our observation of the tendency of stationary type electrodes to break at the junction of stem and cylinder, a fault which we overcame by reinforcing this joint.

Let us send you a copy of *Data Concerning Platinum*. It tells about our products and is a very valuable reference work too.



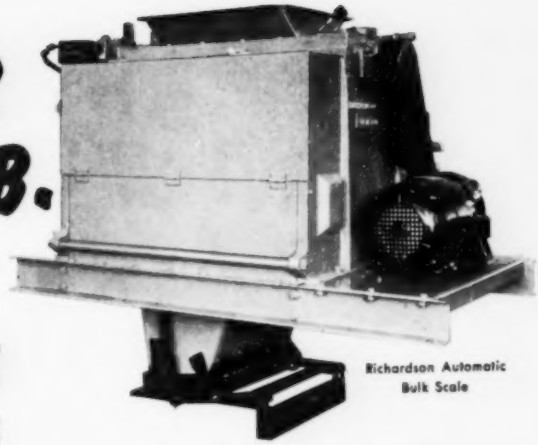
BAKER & CO., INC.

113 Astor St., Newark 5, N. J.

NEW YORK SAN FRANCISCO CHICAGO

10 LB. OR 10,000 LB.

THE RICHARDSON AUTOMATIC BULK SCALE



Richardson Automatic Bulk Scale

WEIGHS PROPORTIONS BLENDS } ACCURATELY AND UNIFORMLY . . . . *at less cost!*

Name your material—alum, borax, ores, clays, minerals, salts, soda ash, potash . . . any dry, ground or granular products, hot or cold, corrosive or abrasive and the Richardson Automatic Bulk Scale will weigh, proportion and blend it accurately, *at high speed*—assure uniformity of your end product at low cost.

Combine two or more Richardson Bulk Scales in battery and you can:

- Weigh different materials in desired proportions with perfect coordination of discharge, regardless of rate of flow or ratio of ingredients.
- Automatically discharge on a time schedule, pre-set for each material.
- Automatically record individual weights.
- Handle a precise tonnage per hour.
- Automatically stop the battery if any one scale runs out of material.
- Cut any unit out of the combination when mixes are changed.

Heart of the Richardson scale is the equal-arm balance system, the most accurate known and the most dependable. Dustproof housing protects vital parts of scale . . . special agitator keeps sluggish materials moving . . . automatic stop counter delivers exact number of weighings per batch . . . solenoid release permits remote control of discharge.

It will pay you to further investigate the possibilities of more profitable processing in your operations, through weighing your materials with Richardson Scales.

Richardson Automatic Bulk Scales are available for quantities of 10 lb. to 10,000 lb., built to your particular requirements. Write for Bulletin, or consult a Richardson engineer regarding your specific set-up.

MATERIALS HANDLING AT WEIGHT

TYPE OF GROUND, DRY OR GRANULAR MATERIALS

Alum • Borax • Lime • Calcium Chloride • Graphite • Carbon Black
Feldspar • Nitrates • Clays • Ores • Talc • Salt • Fullers' Earth
Potash • Sludge • Soda Ash • Phosphates

Handled by RICHARDSON SCALES

RICHARDSON SCALE COMPANY
CLIFTON, N. J.

Atlanta • Boston • Buffalo
Chicago • Minneapolis • Montreal
Omaha • New York • Philadelphia
San Francisco • Toronto • Wichita

Completely Automatic Control of Plant Processes...



BRISTOL'S SYSTEM OF COORDINATED PROCESS CONTROL— PIONEERED BY BRISTOL OVER 20 YEARS AGO PERFECTED THROUGH HUNDREDS OF SUCCESSFUL INSTALLATIONS

WHAT IT IS . . . Bristol's System of Coordinated Process Control culminates 60 years of precision instrument making. It is an engineered combination of automatic control instruments built in the form of a master control station. It controls, coordinates and interlocks all the vital variables in the processing cycle so that each takes place precisely *when* it should and *how* it should. A Bristol Cycle Controller acts as the "mechanical brain", coordinating all the other instruments. The system is shipped completely assembled, requiring only main power and air connections to put it to work in your plant.

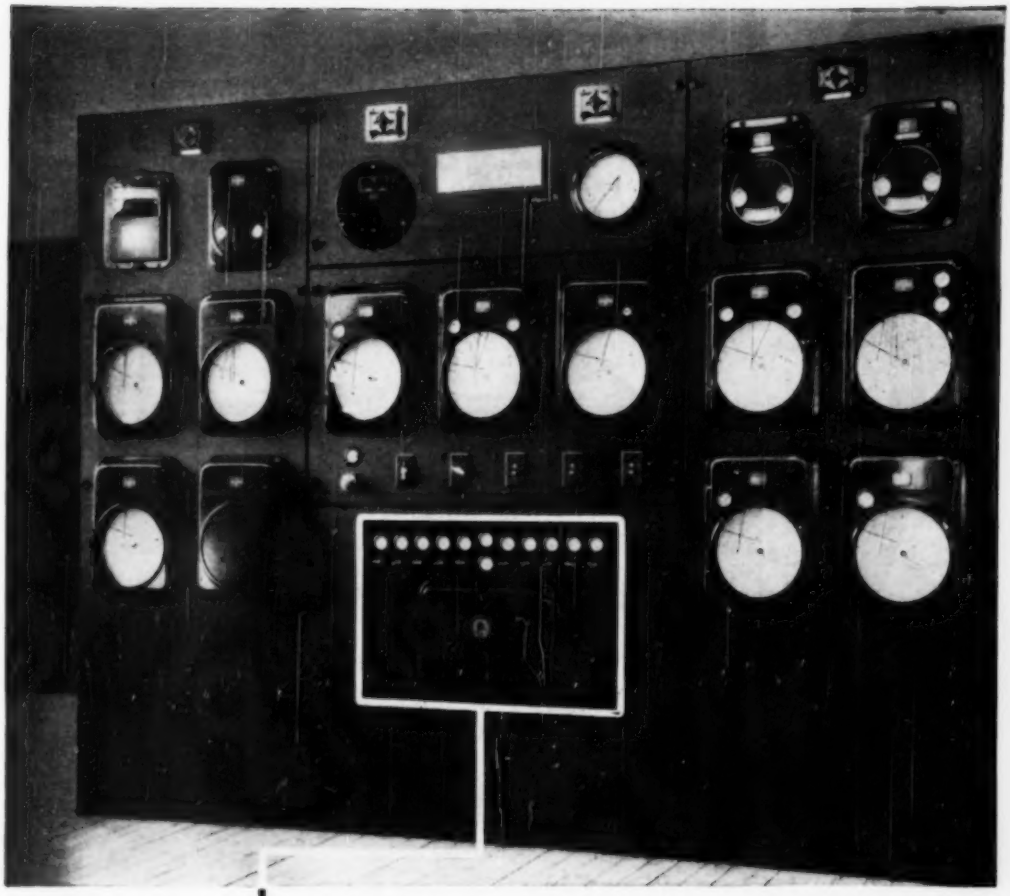
WHAT IT DOES . . . Coordinated Control allows plant processing to conform to the exact plan which research and experience show produces optimum results. It times the operation of valves, pumps, blowers, dampers, switches, etc., and controls at predetermined values such variables as temperature, pressure, liquid level, flow, humidity, speed, pH, and vapor concentration. It eliminates variations in processing that cause inefficiency. It cuts down rejections and waste . . . insures product uniformity . . . quickly pays for itself.

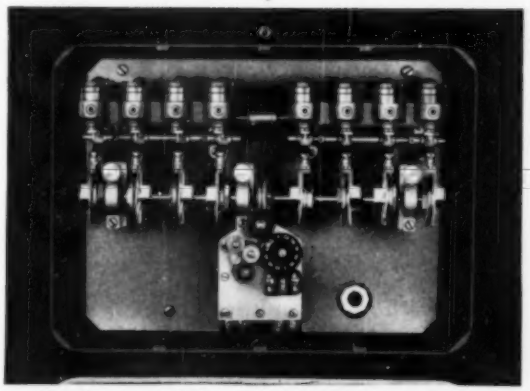
WHY YOU SHOULD INVESTIGATE BRISTOL COORDINATED CONTROL . . . For every industrial process there is one set of conditions which produces the best results. These conditions can be achieved in the laboratory or pilot plant, but usually with difficulty in actual production. With Bristol Coordinated Control, the exact "formula", sequence of operations and degree of control necessary for maximum plant efficiency, product quality and uniformity can be transferred to the production stage with mathematical precision. The control system holds processing to the proper schedule and maintains the set conditions known to produce the best results . . . automatically. The apparatus is extremely flexible. Processing schedules are easily adapted to changing conditions.

NEW EFFICIENCY FOR A NEW ERA . . . With costs up all along the line, processing efficiency is more important than ever in securing competitive advantage. Bristol's Coordinated Process Control System is the most modern, most effective way to meet the challenge of rising costs . . . to secure new margins of profits . . . to open up new productive horizons. Each installation is separately engineered to the requirements of the process involved.

One example of its use is shown nearby. There are hundreds. Have us tell you more. THE BRISTOL COMPANY, 109 Bristol Road, Waterbury 91, Conn. (The Bristol Co. of Canada, Ltd., Toronto, Ont.; Bristol's Instrument Co., Ltd., Lynch Lane, Weymouth, Dorset, England.)

AUTOMATIC CONTROLLING, RECORDING,





Bristol Process Cycle Controller, the "MECHANICAL BRAIN" of the above Coordinated Process Control System.

Above is a picture of a typical Bristol Coordinated Process Control System—completely automatic control of plant processes according to the schedule known to produce the desired results. Hundreds of these systems are in successful operation today. This modern technique of process control is being used by some of the most progressive and successful manufacturers in this country.

60 YEARS...1889-1949

BRISTOL

Coordinated Process Control

AND TELEMETERING INSTRUMENTS



No Wrinkles... No Cracks... No Blowouts!

no place for leaks in THIS heat exchanger gasket

TAKE A CLOSE LOOK at the Goetze heat exchanger gasket shown above. Note the absence of cracks on outside corners . . . of wrinkles on inside corners . . . the uniform width of the ribs . . . the generous overlap of the metal jacket.

Attention to such important details is typical of the kind of care that goes into the forming of these custom-made gaskets. It is the secret of their dependable service—why you can count on them to stay on the job indefinitely without leaks or blowouts. And it's the reason they pay off in terms of less down-time and in the savings that result when gaskets *don't* have to be replaced at frequent intervals.

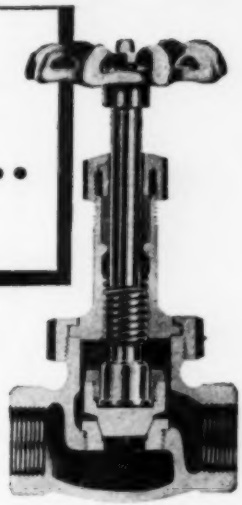
• • •

You can have Goetze heat exchanger gaskets made in any size or shape. Estimates and recommendations will be furnished promptly on request. Write Johns-Manville, Box 290, New York 16, N. Y.

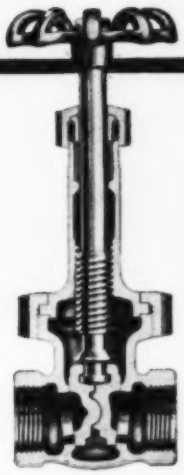
JM PRODUCT

Johns-Manville *Goetze* Gaskets

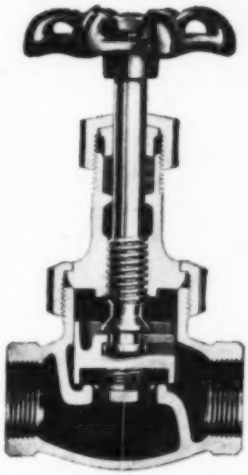
Walworth bronze valves...



Walworth No. 225P Globe Valve
500 Brinell Seat and Disc



Walworth
No. 29 Gate Valve



Walworth No. 95 Globe Valve
Re-New-Disc

built to give dependable trouble-free service on all recommended jobs

Walworth No. 95 Bronze Globe Valves (Angle Type: No. 96) are recommended for service where throttling is not required. They are rated at 150 psi working steam pressure, 500F; 300 psi cold water, oil or gas. The improved renewable disc and lock-on, slip-off disc holder — an original Walworth development—saves time and trouble. This valve can be repacked under pressure when fully opened. All parts are designed to give maximum service and strength.

Walworth No. 29 Bronze Gate Valves are rated at 200 psi working steam pressure, 550F; 400 psi cold water, oil and gas. These valves have rising stems and integral seats. Sizes 2-inch and smaller have union bonnets; sizes 2½ and 3-inch have bolted bonnets. Valves up to and including ¾-inch have solid wedge discs; 1-inch and larger have split wedge discs. These valves can be repacked under pressure when fully opened.

Walworth No. 225P Bronze Globe Valves (Angle Type: No. 227P) are rated at 350 psi working steam pressure, 550F; and 1000 psi non-shock service on cold water, oil and gas. The stainless steel, plug type seat and disc — heat treated to 500 Brinell — can be closed on sand, slag, scale and similar floatage, without injury to the seating surfaces. They are the longest wearing, TOUGHEST bronze valves you can buy.

For full information about Walworth Quality Bronze Valves, see your Walworth distributor, or write:







WALWORTH
valves and fittings
60 EAST 42nd STREET NEW YORK 17, N. Y.



DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

It takes POWELL VALVES *to*



complete your production picture

Everyone knows that in putting together a jig-saw puzzle picture it's simply a matter of the right piece in the right place.

In the case of flow control equipment the principle is the same. Because, only by installing the right valve — in design and material — to meet all the requirements of a specific service, can failures due to misapplication be eliminated.

Fortunately Powell *has been* applying this principle for more than a century. The result is a line of valves which is so complete that, for any set of flow control conditions encountered today, there's a Powell Valve that exactly fits all requirements.

So why not let Powell Engineers help you to complete your industrial picture by selecting valves that are specifically designed for your individual flow control services. Write us for details.

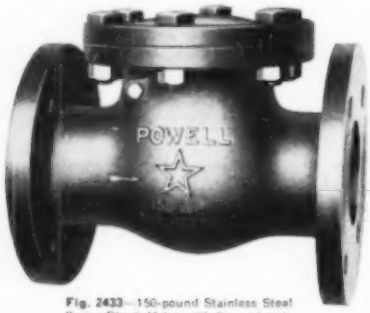


Fig. 2433—150-pound Stainless Steel Swing Check Valve with flanged ends and bolted flanged cap.

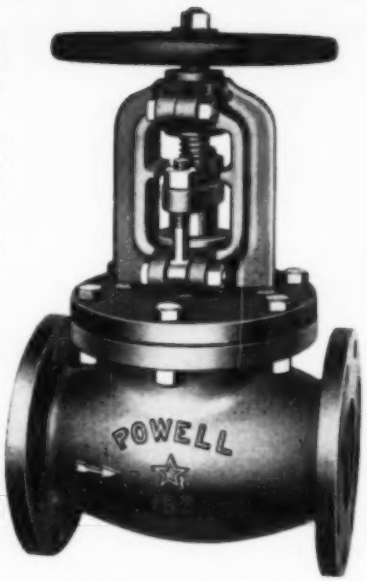


Fig. 2429—150-pound Stainless Steel Globe Valve with flanged ends, bolted flanged yoke and outside screw stem.

POWELL

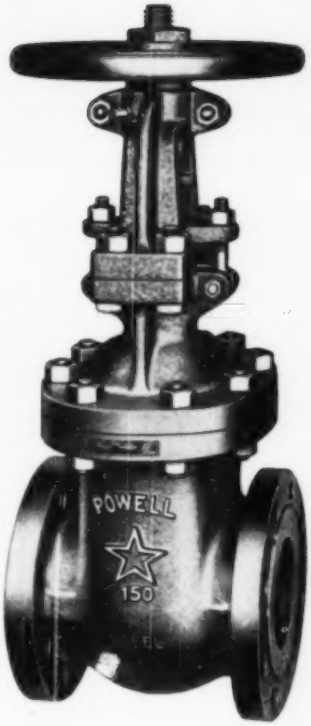


Fig. 1503—Class 150-pound Cast Steel Gate Valve with flanged ends, outside screw rising stem, bolted flanged yoke and tapered solid wedge.



Fig. 375—200-pound Bronze Gate Valve with screwed ends, inside screw rising stem, union bonnet and renewable wear-resisting "Powellium" nickel-bronze disc.

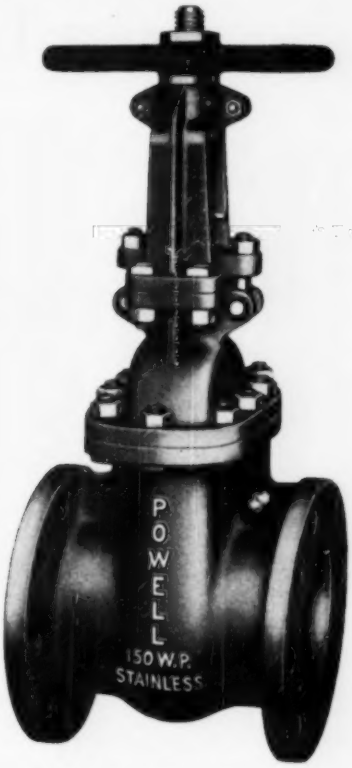


Fig. 2453-G—Large 150-pound Stainless Steel Gate Valve. Made in sizes 5" to 30", inclusive. Has bolted flanged yoke-bonnet, outside screw rising stem and tapered solid wedge.

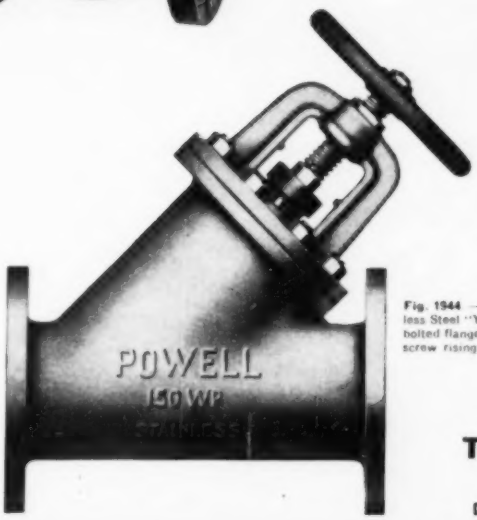
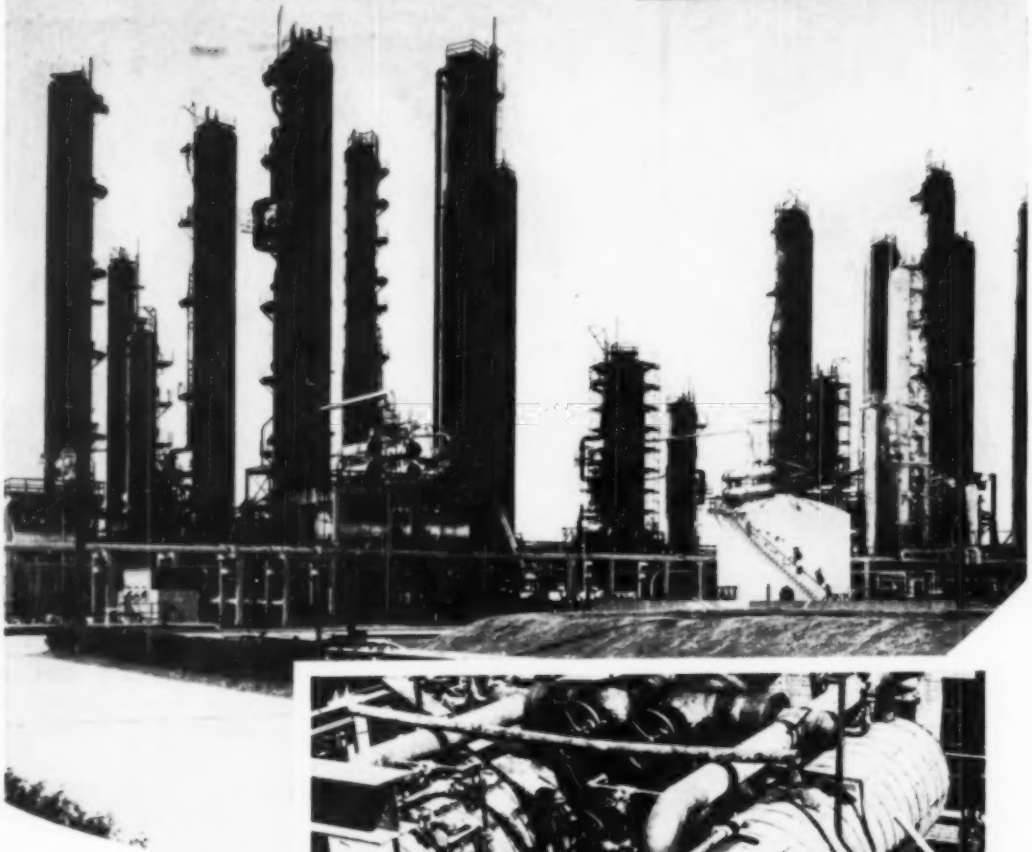


Fig. 1944—Large 150-pound Stainless Steel "Y" Valve with flanged ends, bolted flanged yoke-bonnet and outside screw rising stem.

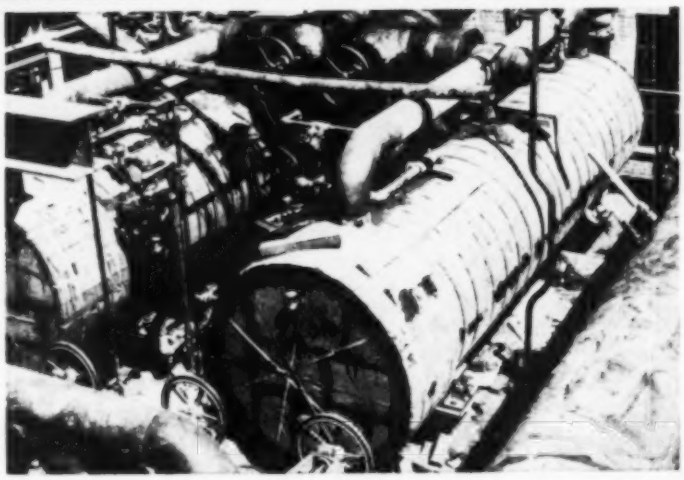
The Wm. Powell Company
Cincinnati 22, Ohio
DISTRIBUTORS AND STOCKS IN ALL PRINCIPAL CITIES

VALVES

Insulate the first time



This picture of the Neches Butane Products Company's plant at Port Neches, Texas, shows a variety of fractionating towers, all insulated with PC Foamglas.

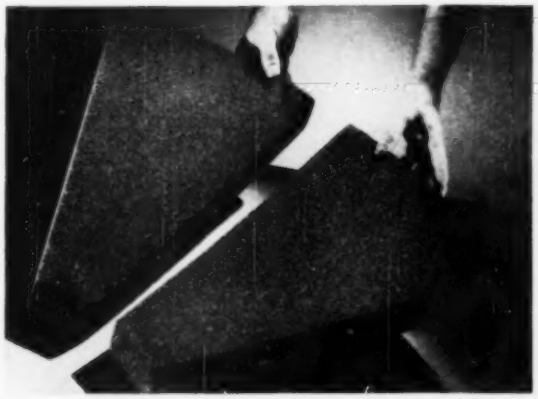


This picture shows how PC Foamglas is used to insulate tanks and pipe lines. The material is available in standard blocks, curved segments and beveled logs to fit tank sides, heads and domes and in preformed sections for standard pipe sizes and fittings.

PITTSBURGH PC CORNING

FOAMGLAS INSULATION

for the last time with PC FOAMGLAS



These are curved segments of PC Foamglas for use on tank heads. PC Foamglas can be easily cut and formed with ordinary tools, to fit all sorts of irregular shapes.

the permanent material for industrial insulation

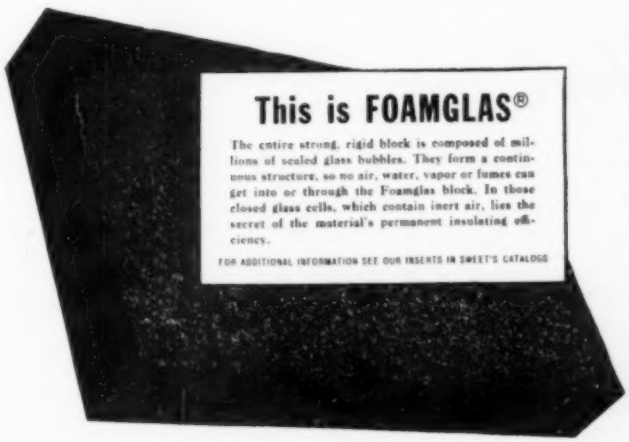
It's Acidproof, Fireproof, Waterproof

Replacements—repairs—maintenance—those are the main reasons why costs mount up when you use ordinary insulating materials. That is why so many plant engineers are saving time, trouble and money by insulating tanks, towers, retorts, hot and cold piping, ducts, breeching, evaporators, heat exchangers—and other processing equipment—with PC Foamglas.

PC Foamglas is true glass in cellular form (see illustration). It is therefore impervious to moisture, fire, vapor, fumes, acids, most solvents and other elements that cause many materials to lose insulating efficiency in processing plants.

First cost is last cost when you insulate with PC Foamglas, because, when installed according to our recommendations and specifications, this unique material retains its original insulating efficiency *permanently*.

Our insulating specialists will be glad to help you work out your individual insulating problems, to show you where and how you can use Foamglas to the best advantage. Just drop a line, without obligation, to Pittsburgh Corning Corporation, Dept. R-49, 307 Fourth Ave., Pittsburgh 22, Pennsylvania.



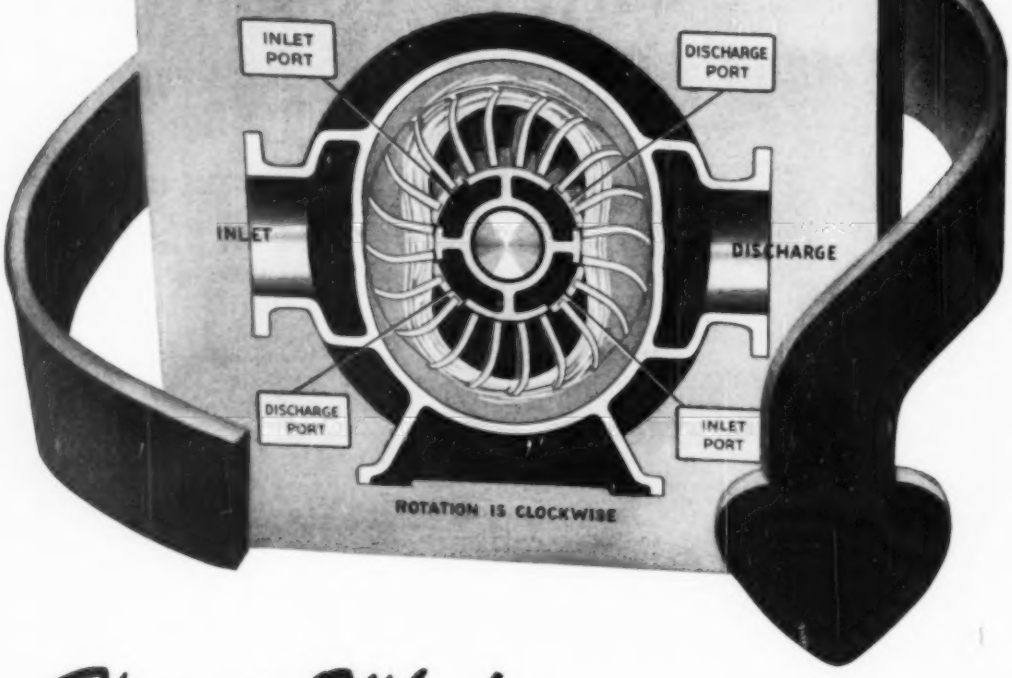
This is FOAMGLAS®

The entire strong, rigid block is composed of millions of sealed glass bubbles. They form a continuous structure, so no air, water, vapor or fumes can get into or through the Foamglas block. In those closed glass cells, which contain inert air, lies the secret of the material's permanent insulating efficiency.

FOR ADDITIONAL INFORMATION SEE OUR INSERTS IN SWEET'S CATALOGS

When you insulate with Foamglas...you insulate for good!

Nash Instrument Air Compressors deliver only clean air, free from oil or dust, and without filters



Here is Why!

You can dispense with oil filters and dust filters when you install ®Nash® Clean Air Compressors. You can save the cost of maintaining these devices. You can greatly reduce instrument maintenance costs. For the Nash employs no internal lubrication, therefore no troublesome oil is in the delivered air. Moreover, air from a Nash is thoroughly washed and cooled as it passes thru the pump. Dust in the plant atmosphere, even fly ash, is immediately removed.

®Nash® Clean Air Compressors are simple, with only one moving element. No valves, gears, pistons, sliding vanes, or other enemies of long life and constant performance complicate a Nash. No aftercoolers are needed. You will find it profitable to investigate these pumps, now.

No oil filters.
No dust filters.
No internal lubrication to contaminate air handled.
No internal wearing parts.
No valves, pistons, or vanes.
Non-pulsating pressure.
Original performance constant over a long pump life.
Low maintenance cost.

NASH ENGINEERING COMPANY
373 WILSON, SO. NORWALK, CONN.

ALLIS-CHALMERS ANNOUNCES

New Car Shaker



FOR FAST UNLOADING OF DROP-BOTTOM GONDOLA CARS

COSTLY MAN-HOURS are saved and casualties eliminated with use of the A-C Car Shaker in unloading of coal, cinders, ore, slag, coke, gravel and other granular materials from drop-bottom gondola cars.

Handled by a crane or hoist, the Car Shaker is placed on the top flanges of the car. When the motor is started, the vibratory motion of the shaker is transmitted to the car and loosens the material so it flows from the hopper openings.

Weighing approximately five tons, the all-welded unit is 11 ft long, 5 ft wide and 4 ft 4 in. high.

The shaker is furnished as a "packaged" unit with Allis-Chalmers motor, *Texrope* V-belt drive and separate starter.

For complete information on how this new Car Shaker can help *you* save time and money, contact your nearby A-C district office. Or send in the handy coupon below.

SIX FEATURES OF A-C CAR SHAKER

1. Motor is located inside body; drive completely covered by guard.
2. Size of body and shoes designed to fit all gondola cars.
3. Simplified mechanism reduces number of working parts.
4. Hydraulic arrangement for bearing removal.
5. Car Shaker heavily designed — Stress Relieved after welding and before machining.
6. Shaker is well balanced for ease in handling.

Texrope is an Allis-Chalmers trademark.

ALLIS-CHALMERS, 1147A SO. 70 ST MILWAUKEE, WIS.

Please send Bulletin describing A-C Car Shaker.

Name.....

Address.....

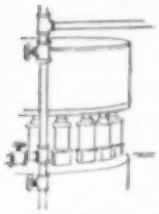
Firm.....

A-2678

A-C ALLIS-CHALMERS

ALLIS-CHALMERS

Prevent Contamination ..Use Globe Stainless Steel Tubes



If you have a contamination problem . . . if it involves tubing . . . consult Globe Steel Tubes Co.

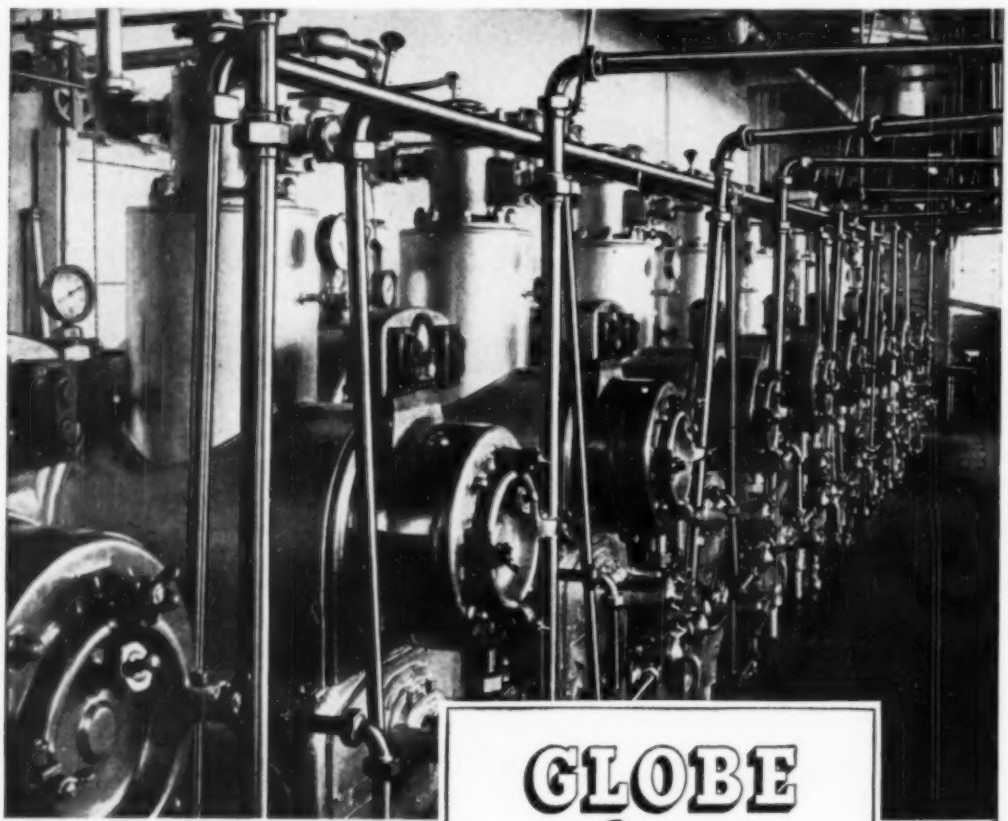
Why consult Globe? Because for 40 years they have been assisting processing industries to solve problems of contamination, sanitation, corrosion, scaling and other causes for tube failure.

Today's wide variety of stainless steels pose problems in selection . . . Globe Steel Tubes Co. has the experience and "know how" to help you in selecting seamless stainless steel tubing or Gloweld (electric welded) stainless steel tubing in the exact analysis, size and finish you need. What's more, your requirements will be worked out in your plant and in cooperation with your engineers . . . tested and approved in the Globe Steel Tubes Co.'s fully equipped metallurgical, physical and chemical laboratories . . . to assure you most satisfactory results with a maximum of economy.

Let Globe Steel Tubes Co. assist you in surveying your tubing needs and you are assured of an outstandingly dependable source for steel tubing of all kinds: Stainless, Mechanical, Alloy Steel and Pressure . . . a wide range of sizes and types to meet your requirements . . . plus the engineering and research facilities to solve your tubing problems.

GLOBE STEEL TUBES CO., Milwaukee 4, Wisconsin.

Photo Courtesy Creamery Package Mfg. Co.



GLOBE
Stainless
STEEL TUBES



Free valuable technical data in Globe's new Stainless Steel Analysis Chart, Bulletin No. 301.

WE CALL 'EM

Waterproof Bags

...BUT...THIS KIND OF PROTECTION IS ONLY ONE OF THEIR FUNCTIONS

Bemis Waterproof Laminated Textile Bags are extra strong, and they're specially constructed to guard against:

- Change in moisture content
- Contamination
- Sifting losses
- Undesirable odors
- Insect infestation
- Loss of aroma



Up to 5-Layer Construction:

1. Flexible creped kraft paper*
2. Waterproof adhesive
3. Middle layer of paper
4. Waterproof adhesive
5. Outer layer of burlap or cotton

* This may be parchment paper, or various plastic films, depending upon your requirements.

If you have a "hard-to-pack" product or one that must stand the rough handling of l.c.l., truck, or export shipment, it will pay you to investigate the advantages of Bemis Waterproof Bags.

BEMIS Waterproof BAGS

Bemis

"America's No. 1 Bag Maker"

BEMIS BRO. BAG CO., Waterproof Dept.
408 Pine St., Box 18, St. Louis 2, Mo.

Please send complete information about Bemis Waterproof Bags for

_____
(Product)

Name _____

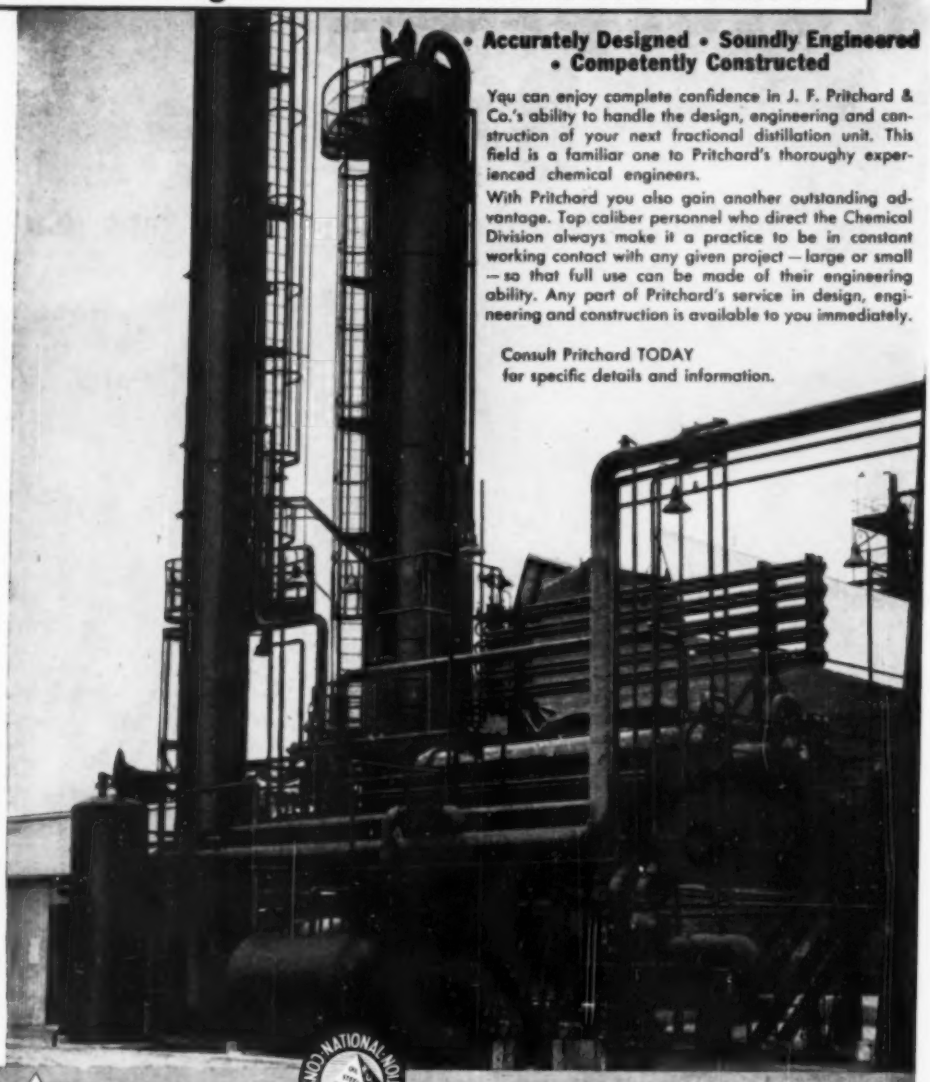
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Turn to Pritchard

For Exacting Fractional Distillation Processes



• Accurately Designed • Soundly Engineered • Competently Constructed

You can enjoy complete confidence in J. F. Pritchard & Co.'s ability to handle the design, engineering and construction of your next fractional distillation unit. This field is a familiar one to Pritchard's thoroughly experienced chemical engineers.

With Pritchard you also gain another outstanding advantage. Top caliber personnel who direct the Chemical Division always make it a practice to be in constant working contact with any given project — large or small — so that full use can be made of their engineering ability. Any part of Pritchard's service in design, engineering and construction is available to you immediately.

Consult Pritchard TODAY
for specific details and information.

J.F. Pritchard Co. — THREE FUNCTIONS — Engineering, Construction, Manufacturing — IN FIVE FIELDS — Serving the CHEMICAL, POWER, PETROLEUM and GAS industries as well as providing specialized EQUIPMENT for all industries.

NATIONAL CONSTRUCTORS ASSOCIATION — MEMBER

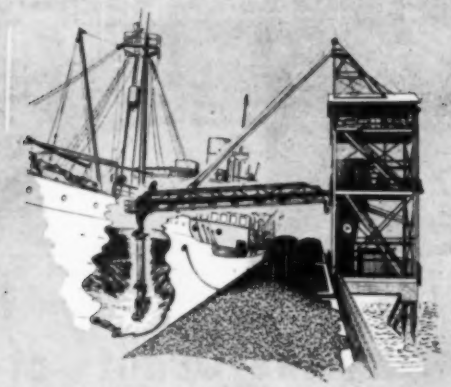
CHEMICAL DIVISION

J.F. Pritchard & Co.

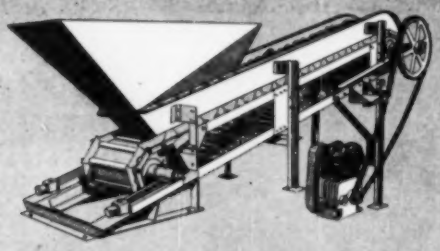
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S-A centrifugal action boat trimmer for loading and trimming bulk materials into holds of ships.



S-A pan conveyor for feeding bulk materials.

Stephens-Adamson Engineers are Qualified to

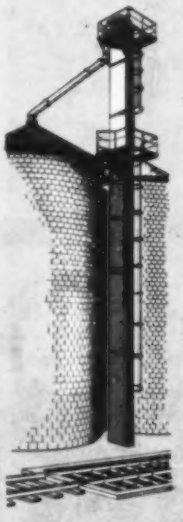
SURVEY Your SYSTEM

for Handling Bulk Materials

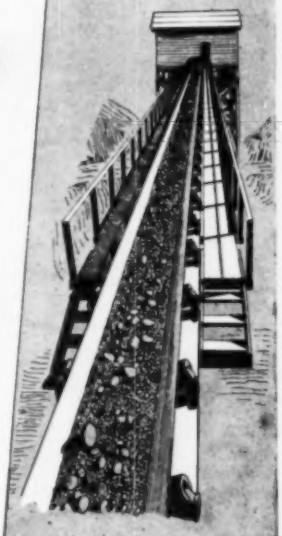
We offer a check-up by our well-qualified staff of specialists in handling bulk materials—from lumps to powder.

The reasons for such a survey are *improvement* of product, and saving in handling cost. The recommendations you receive will be based on 50 years of installing successful conveying systems. Since we make *every* type of conveyor, we can propose without prejudice the best type for your job.

Write us to check whether your present conveyor system is right, or could be materially improved.



S-A bucket elevator storing bulk materials in two silos.



S-A belt conveyor with roller bearing equipped carriers.

STEPHEN S-A ADAMSON

5 RIDGEWAY AVENUE, AURORA, ILLINOIS — LOS ANGELES, CALIF. • BELLEVILLE, ONT.

Designers and Manufacturers of All Types of

BULK MATERIAL HANDLING EQUIPMENT

Trentweld Stainless Steel Tubing

Helps Certify the Quality of

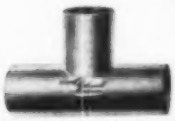
Tri-Clover Zephyrweld Corrosion-Resistant Fittings

Try TRI-CLOVER





Crosses



Tees



Laterals



Return Bends

Here is another functional story on Trentweld's all-around industrial service.

Tri-Clover corrosion-resistant fittings for liquid conveying lines need no introduction to the chemical process industries. Zepherweld ells, tees, laterals, crosses and return bends have earned a reputation for work-horse service by what they do and how they do it — lightweight, high strength fittings, in diameters from 1" through 24" O.D., that will last the lifetime of the flow line. If necessary, Zepherweld fittings can be flame cut for disassembly and used again by re-welding.

Tri-Clover, like many another manufacturer, uses Trentweld tubing because Trentweld matches the standards required of Zepherweld fittings. Trentweld measures up to these exacting specifications where commonplace stainless steel tubing fails, because Trentweld tubing is different in that it is machine-rolled and welded by an exclusive process, and different in that it is machine-sized for accuracy. These characteristics add to the stamina of Zepherweld fittings and help reduce Tri-Clover's costs in fabrication.

If you have an application for this type of lightweight, extra-strong, precision-made stainless steel tubing, available in diameters from ⅛" to 30", your inquiry will be welcome. Write, without obligation, and send for the Trentweld Data Bulletin.

District Offices — New York, Chicago

TRENT TUBE COMPANY

TRENTWELD STAINLESS STEEL TUBES

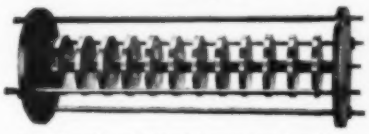
Subsidiary of CRUCIBLE STEEL COMPANY OF AMERICA

420 Church Street, East Troy, Wisconsin

WANTED!

MORE TOUGH JOBS for Chemalloy





These Test Discs Solve Special Corrosion Problems. If studies of your alloy requirements do not supply sufficient information on which to base alloy recommendations, these test discs are put to work in your plant. Exposed to actual service conditions under which your castings will be used —they determine the correct alloy for your job.

Cast stainless steel hydraulic turbine runners have to be right. The intricate shapes and thin metal sections make the job a tough one. What's more, surfaces must be clean—and the casting free from inclusions—to save machining time and costs. Add these to the corrosive elements encountered and you'll see why Chemalloy was chosen for these two jobs.

Chemalloy castings are uniformly clean . . . machine fast and easy with a good surface because quality is consistent—inside and out.

Where does Chemalloy get this uniformity? 1. Research, experience and skill in dealing with high alloy castings. 2. The combination of the correct corrosion resistant alloy and proper foundry technique. 3. Metallurgical control in each step of production. 4. X-ray inspection to doubly insure quality all the way through.

These runners are typical of the work being done by Electro-Alloys. They illustrate how Chemalloy is being used for the most intricate corrosion resistant castings.

Do you have a "tough" job? One that calls for corrosion resistance? Let one of our engineers explain how Chemalloy can help you. Write to Electro-Alloys Division, 1991 Taylor Street, Elyria, Ohio.

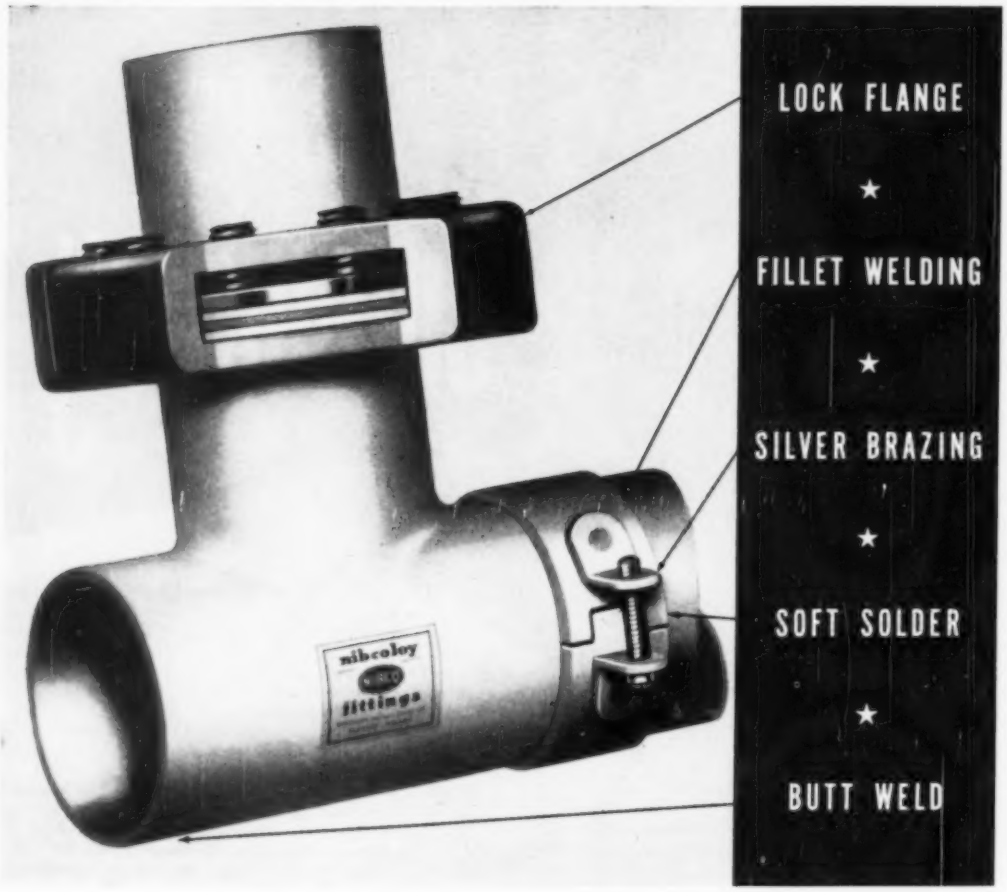
SPECIFY **CHEMALLOY** FOR CORROSION RESISTANCE . . . **THERMALLOY** FOR HEAT AND ABRASION RESISTANCE

Mixer Arms • Filter Drums • Fittings • Dryer Parts

AMERICAN Brake Shoe COMPANY

ELECTRO-ALLOYS DIVISION
ELYRIA, OHIO

5 METHODS OF CONNECTING NIBCOLOY WROT FITTINGS



These five methods of connecting NIBCOLOY Wrot Fittings provide sufficient variety to suit your shop facilities and meet the conditions of piping installations where sanitation, corrosion resistance, and reduction of turbulence are prime requirements. NIBCOLOY fittings are *wrot* from tubes in one operation, providing smooth interior surfaces. Elbows, tees, adapters are available in sizes from ¼" to 4" O. D., in Inconel, Nickel, Monel and stainless steel 316—347—304. Write now for Catalog 902. Northern Indiana Brass Co., 402 Plum St., Elkhart, Indiana.

Nibcoloy

"When you want this valve to work . . . it works"

it's

Stick-Proof

because it's LEVER-SEALD



HOMESTEAD LEVER-SEALD VALVES operate *instantly* with only a *Quarter-Turn* . . . at all times and under all conditions . . . in services where extremes of temperature, pressure, or the corrosive action of line fluids would cause ordinary valves to stick or "seize."

That's why they have been favorites with industry for more than 15 years in all sorts of difficult applications.

They're *stick-proof*, because built right into each valve is a powerful lever and screw device that *relieves seating pressure* between plug and body just enough to overcome friction and permit *easy turning*.

This *stick-proof* construction is only one of many HOMESTEAD LEVER-SEALD VALVE features assuring long, economical, trouble-free service.

You may order HOMESTEAD LEVER-SEALD VALVES in metals and alloys to meet service requirements, in sizes from 1½" to 12" with regular or wedge gate valve face to face dimensions, for pressures from vacuum to 1500 pounds. Complete technical details and Valve Reference Book No. 38 are yours for the asking.

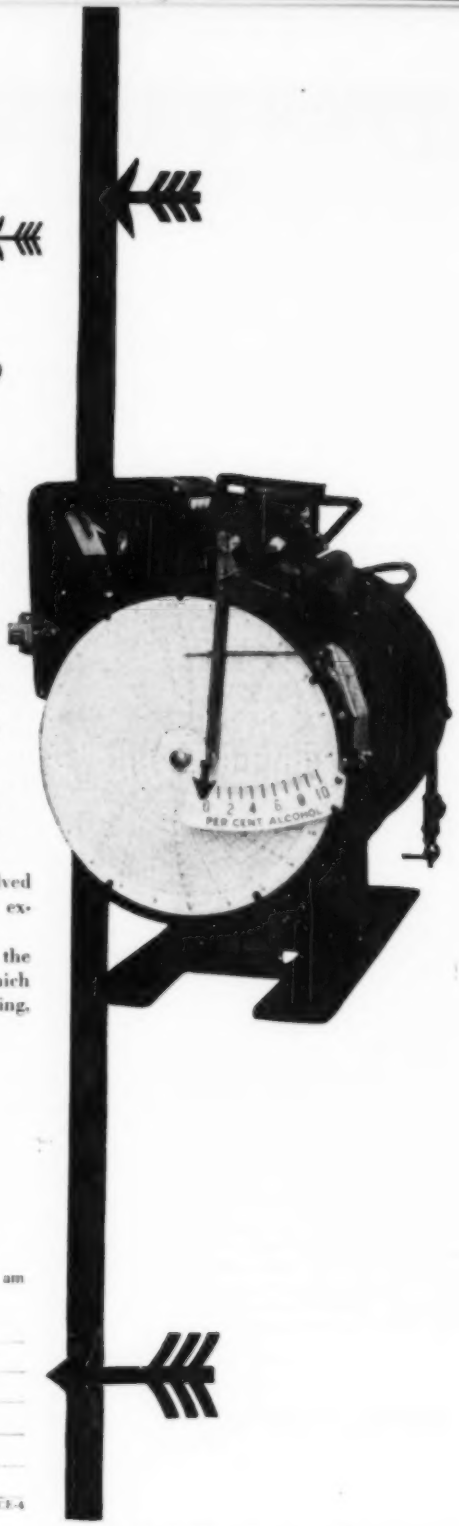
CHECK THESE OUTSTANDING LEVER-SEALD VALVE FEATURES

1. Instant stick-proof operation.
2. Quarter-turn fully opens or closes.
3. Positive mechanical seal.
4. Seating surfaces always protected in both open and closed positions. Corrosion practically eliminated.
5. Unobstructed straight-line fluid flow.
6. All operating parts protected from damaging effects of service conditions and weather.

HOMESTEAD VALVE MANUFACTURING COMPANY

P. O. BOX 13 CORAOPOLIS, PA.

How would YOU *measure one constituent . of a flowing solution?*



That was the problem in a large alcohol plant—to measure the *net amount of alcohol* in a flowing solution of alcohol and water in varying proportions to and from the recovery units. This type of measurement is easily accomplished with a standard model of the dual type Hagan Ring Balance Flow Meter.

The meter used for this application is shown in the photograph. The high-differential ring measures raw flow; the low-differential ring measures specific gravity. Two of the three pens record these quantities on the chart, and a pointer on the specific gravity pen indicates the percentage of alcohol in the solution at any instant.

A third pen is so linked to the two rings that it records flow compensated for specific gravity—and records it as *net volume of alcohol*. The integrator continuously totalizes this alcohol flow.

This is only one of many problems which are easily solved with this Hagan Ring Balance Meter—and which may be extremely difficult to solve in any other way.

For more detailed information on these meters, just fill in the coupon below, or write us about any specific problem in which you may be interested. Hagan Corporation, Hagan Building, Pittsburgh 30, Pa.

HAGAN CORPORATION

RING BALANCE FLOW AND PRESSURE INSTRUMENTS
THRUSTORQ FORCE MEASURING DEVICES
BOILER COMBUSTION CONTROL SYSTEMS
METALLURGICAL FURNACE CONTROL SYSTEMS

HAGAN CORPORATION • RING BALANCE METER DIVISION
323 FOURTH AVENUE • PITTSBURGH 30, PA.

Please send full information on Hagan Ring Balance Flow Meters. I am particularly interested in the application described below.

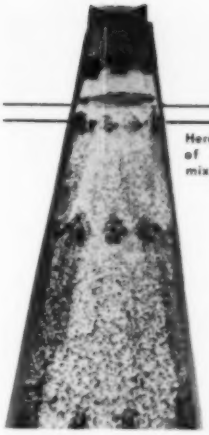
NAME _____ POSITION _____

COMPANY _____

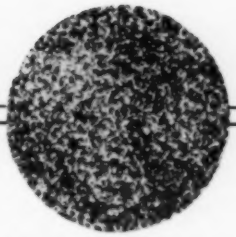
STREET AND NUMBER _____

CITY AND STATE _____

CE-4

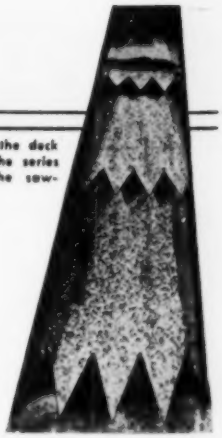


Here you can see the action of two materials being mixed as they are conveyed



This magnified view shows a mixture after being conveyed only 8 feet.

Here you can see the deck construction and the series of steps. Note the saw-tooth edges.



Interested in

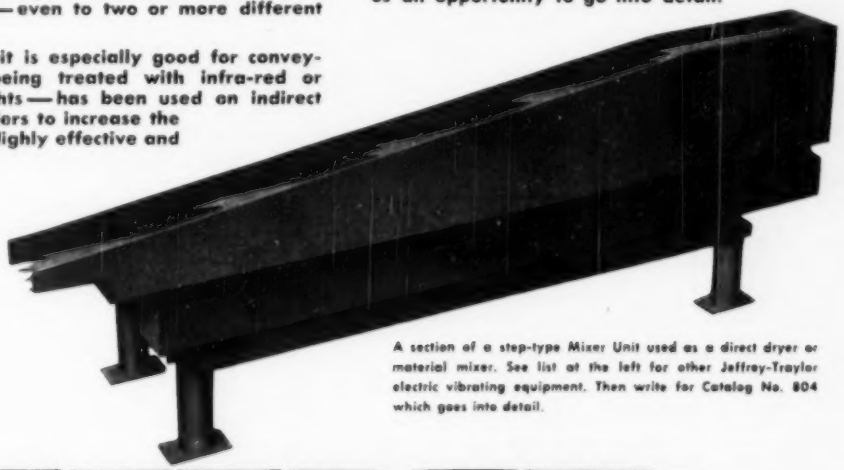
MIXING · DRYING · COOLING?

Then you'll want to know more about this Jeffrey-Traylor patented Mixer or step type of Conveyor. Look at the photos — note the series of steps with saw-tooth edges. The material passes over these steps, the side slip discharge causing an intermingling of particles — turnover being partially or completely effected. Material is thoroughly mixed — even to two or more different materials.

This type of unit is especially good for conveying material being treated with infra-red or ultra violet lights — has been used on indirect dryers and coolers to increase the heat transfer. Highly effective and essential in roasting or toasting processes — possible to produce uniformly toasted material (throughout the bulk) when other methods have failed.

We will be very happy to tell you more about this process and what it can do for you. Give us an opportunity to go into detail.

Feeders
Dryers
Coolers
Conveyors
Screens
Barrel Packers
Packing Tables
Bin Valves
Bin-Level Controls
Waytrols



A section of a step-type Mixer Unit used as a direct dryer or material mixer. See list at the left for other Jeffrey-Traylor electric vibrating equipment. Then write for Catalog No. 804 which goes into detail.

THE JEFFREY MANUFACTURING COMPANY

Established 1877

909 North Fourth St., Columbus 16, Ohio

Complete Line of Material Handling, Processing and Mining Equipment

JM

Baltimore 2	Chicago 1	Detroit 13	Jacksonville 3	Pittsburgh 22
Birmingham 3	Cincinnati 2	Harlan	Milwaukee 2	St. Louis 1
Boston 16	Cleveland 13	Houston 5	New York 7	Salt Lake City 1
Buffalo 2	Denver 1	Huntington 19	Philadelphia 3	Scranton 3

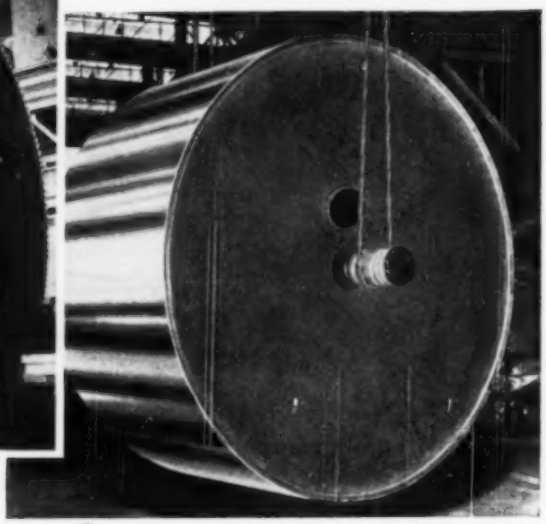
For Jeffrey-Traylor Equipment in Great Britain Lockers (Engineers) Inc., Warrington, England.

Another LUKENWELD Drier Roll ON ITS WAY TO CHAMPION...



The seventh Lukenweld Drier Roll to go into this important service at Champion Paper and Fibre Company; shipped November, 1948. It is 12 feet in diameter, with an 8'4" face.

The first of these Lukenweld Drier Rolls was shipped to Champion, 12 years ago.



for a further boost in Kromekote* production

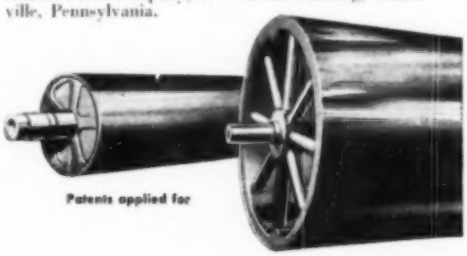
Kromekote's superb printing properties depend upon the uniformity and perfection of this paper's coating. A Lukenweld Drier Roll helped Champion develop the revolutionary methods which gave Kromekote those properties way back in 1937. Six additional Lukenweld Drier Rolls have since been added to take care of the ever-increasing demand.

Repeat orders received regularly from the various industries in which Lukenweld Drier Rolls are working —paper, chemical, drug, food, plastic and other industries—are evidence of their worth. Their welded steel plate construction is strong and dependable; high pressures are employed with safety. Simple in construction, there's nothing to get out of order.

Where Lukenweld Drier Rolls have replaced other rolls, production increases of 18% to 35% have been reported. This is accounted for by the positive removal of condensate and higher steam velocities obtained. Heat is transferred to roll faces rapidly and uniformly.

If you have a drying problem ... In addition to supplying the drier rolls, Lukenweld will design, build and install the complete drying machine. Our engineers can help you speed up production, cut costs and improve products.

For a copy of Bulletin 358 on Lukenweld Drier Rolls or for other drying help, write Lukenweld, Division of Lukens Steel Company, 400 Lukens Building, Coatesville, Pennsylvania.



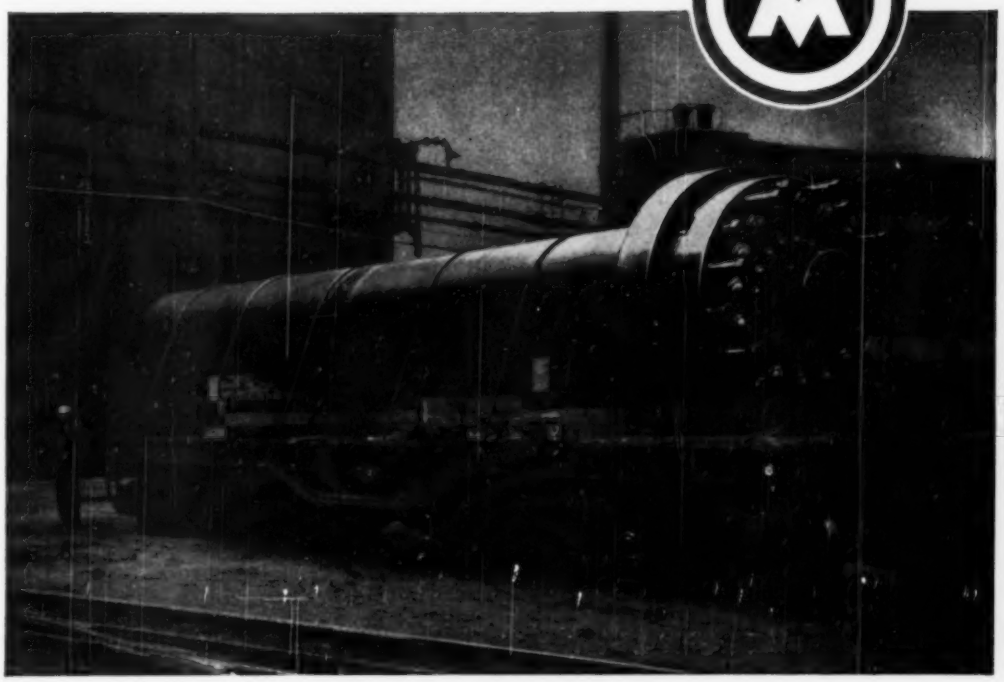
Patents applied for

*T. M. Reg. U.S. Pat. Off. for Champion's Cast Coated Paper

LUKENS
LUKENWELD DIVISION

DESIGNERS, ENGINEERS AND MANUFACTURERS OF MACHINERY

• • SPEED SCRAP TO THE MILLS TO MAKE MORE STEEL • •



CUSTOM MADE PRESSURE VESSEL

Built for dependable performance, this one-piece, hollow forged giant will successfully resist high pressures, high temperatures and corrosive attack. This job—as with all Midvale work—had the careful attention of Midvale metallurgists and engineers from original design to loaded flatcar. Your own requirements for such vessels become our entire responsibility the moment you tell us what they must do. The Midvale Company, Nicetown, Philadelphia.

CORROSION AND HEAT RESISTING CASTINGS
FORGINGS AND RINGS

THE MIDVALE COMPANY
CUSTOM STEEL MAKERS TO INDUSTRY

BRANCH OFFICES: NEW YORK • CLEVELAND • CHICAGO • HOUSTON • WASHINGTON • PITTSBURGH • SAN FRANCISCO



Unfrightened by dire predictions, leaders of American business always have planned with confidence in the future . . . and, in the long run, their faith has paid off. Such courageous leadership helps to *create* good business.

Good business means jobs for those who want to work. It's the best defense against the termites who are working to undermine the individual liberties Americans enjoy.

6593

SKF INDUSTRIES, INC. PHILADELPHIA
BALL and ROLLER BEARINGS



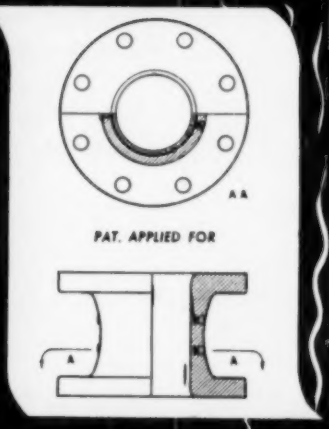
NEW BETHLEHEM FLOW TUBE

(Gentile Patents)

NO STRAIGHT RUN LIMITATIONS
NEGLIGIBLE RESISTANCE TO FLOW

A constant coefficient over 8:1 range of discharge, higher accuracy, more economy, greater range—these are some of the advantages of the new BETHLEHEM FLOW TUBE. Tested by one of the nation's leading hydraulic laboratories, it consists essentially of a short, straight length of pipe equipped with two groups of pressure nozzles around the inner periphery—one group pointing upstream, the other downstream. The nozzle groups are interconnected by common pressure rings from which connections are made to the high and low pressure sides, respectively, of a standard flow meter.

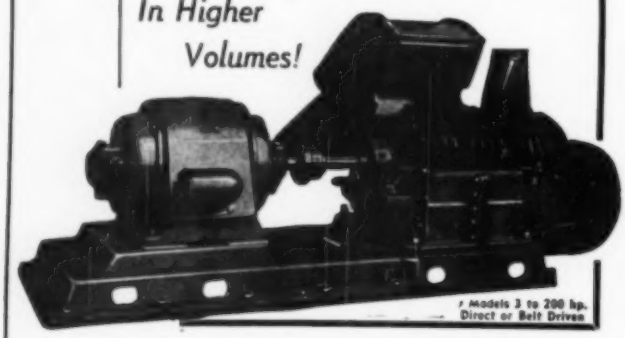
To measure fluid flow rate with greater accuracy . . . more economy . . . investigate this new primary element now! Write for your copy of the folder, "Bethlehem Flow Tube," today.



BETHLEHEM FOUNDRY
& MACHINE COMPANY • BETHLEHEM • PENNA.

TO REDUCE GRANULAR MATERIALS

Faster!
Cooler!
In Higher Volumes!
At Lower Cost!



JAY BEE HAMMERMILLS

OPERATE AT TOP EFFICIENCY ON ANY MATERIAL TO BE GROUND

Jay Bee Hammermills are centrifugal in type with multiple cutting hammers that travel at speeds in excess of 20,000 ft. per minute. Material fed into the mill is suspended over the hammers until it has been shattered to size. Finished particle size range from minus 1/64" to 1½". For additional information, write to J. B. Sedberry, Inc., Franklin, Tennessee, for folder CE-449

THE ONLY MILL WITH CONSTANT FEED CONTROL
The new, revolutionary "Constant Feed Control" creates "Suspension Grinding." There is no rubbing between metal surfaces or screen, still, JAY BEE grinds many materials to powder fineness if desired.

FREE GRINDING TESTS OF YOUR MATERIAL
Send us a sample of the material that you wish to grind and advise as to what fineness you wish it ground, capacity per hour and power available. We will return the ground material with recommendations as to the mill best suited to your needs. There is no charge for this service.

J. B. SEDBERRY, INC.

FRANKLIN, TENNESSEE TYLER, TEXAS

NO CHEMICAL CAN ATTACK TEFLON GASKETS

THESE Gaskets resist all Chemicals, except molten alkalis. You can obtain a perfect seal which outlasts conventional gaskets by many months. Withstand temperatures from minus 160°F to plus 525°F. Gaskets of all styles and sizes to fit all types of processing equipment.

Consider the following performance records:

CHLORINATED SOLVENTS. Manhole Telflon Gaskets on glass-lined reactors, in service one year with plate being opened daily.

BROMINE. Pfaudler Tank Cover Teflon Gasket. Still in service after eight months.

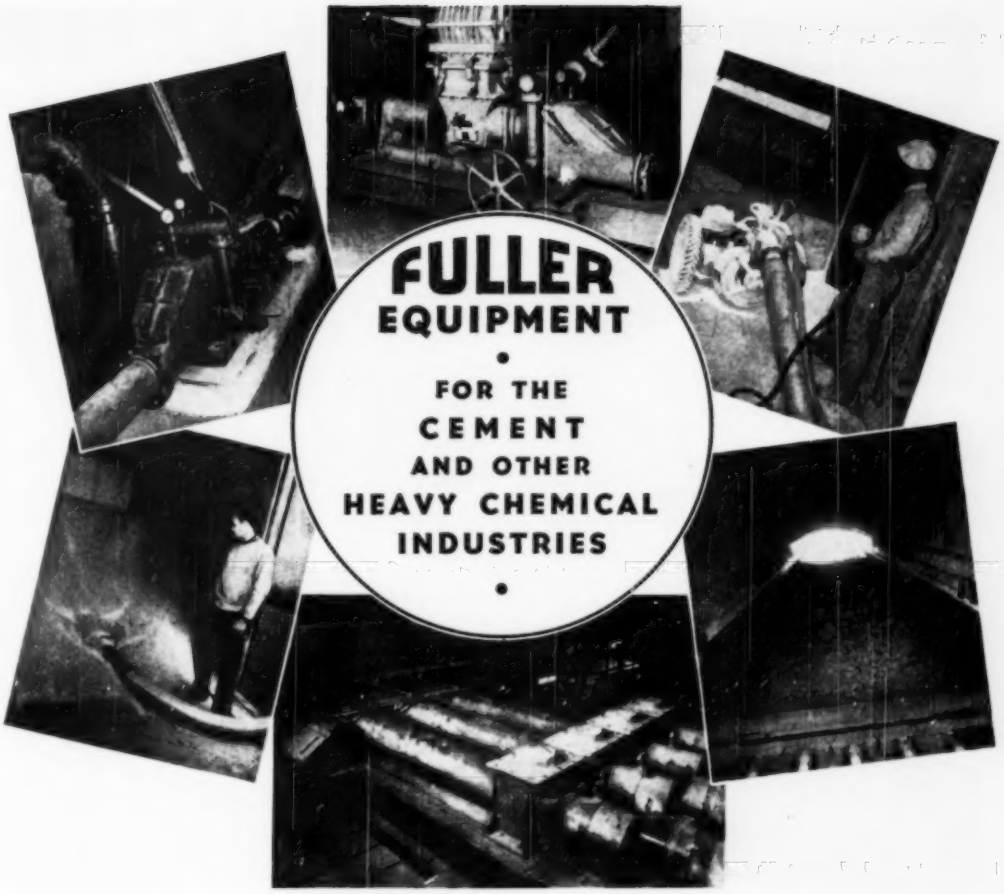
BORON FLUORIDE. Pipe flange Teflon gaskets still in service after six months.

CARBON TETRACHLORIDE AND ACETIC ACID. Teflon Gaskets on tank in service one year.

Special parts available in Teflon —bushings, sleeve bearings, washers, packings, etc. Many available from stock.

Wherever, whenever you have a nasty gasket or packing problem—write or call . . .

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CONVEYING: Fuller-Kinyon Systems, stationary and portable, for unloading, conveying to storage, and reclaiming from storage, dry pulverized materials.

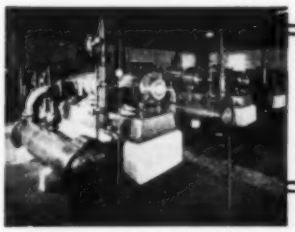
The Airveyor for unloading, conveying to storage, and reclaiming from storage, dry crushed and granular materials.

COOLING: Fuller Inclined-Grate Cooler, for cement clinker, lime, dolomite, iron ores, etc.

Fuller Dry Pulverized-Material Cooler, for finished Portland cement, paint pigments, phenothiazine, barite, etc.

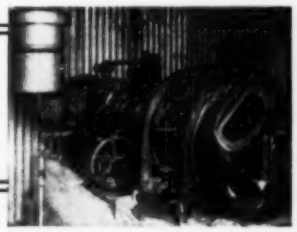
COMPRESSED AIR: Fuller Rotary Compressors and Vacuum Pumps, single and two-stage. Capacities to 3300 c.f.m., pressures to 125-lb., vacuums to 29.90-in. (referred to 30-in. barometer).

CI-54



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AVAILABLE in 5 and 13 gallon sizes to comply with specification ICC 1-A.

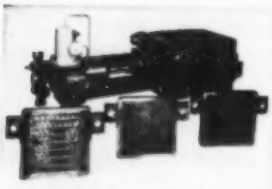
Available in 6½ gallon size to comply with specification ICC 1-D.

NATIONAL BOX & LUMBER COMPANY

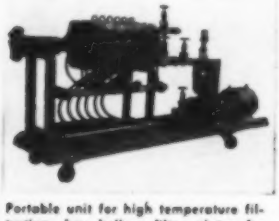
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SHRIVER FILTER PRESSES



Stainless steel press for filtration at 250 p. s. i. has reinforced special plates and screens and Hydro-Kloser device.



Portable unit for high temperature filtration; has hollow filter plates for steam circulation.

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3—Ability to use any filter medium, filter aid or precoat.

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5—Ability to provide any capacity in any number of chambers.

The Shriver Filter Press in stationary or portable types complete with pump and piping is just about the most versatile processing unit for your laboratory or plant. Do you want a copy of catalog 49?

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NATIONAL cast iron
CONDENSING and COOLING SECTIONS

Economy of Design—The unique arrangement of internal fins and swirlers in National Sections makes possible higher transfer rates and lower pressure losses, with resulting savings in pumping costs and space requirements.

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Economy of Performance—External design provides for unrestricted flow of water as a film from one section to the next, with a minimum of splashing. National Sections require far less cooling water than other types of cascade coolers. When submerged in a box, their smooth exterior surfaces give little opportunity for the collection of foreign matter, so high performance is maintained for longer periods.

Economy of Maintenance—The corrosion resistance of Cast Iron, under many varied and severe conditions, insures long periods between maintenance shutdowns. Units are divided into many component parallel stacks of sections, so that sections can be replaced easily, and with little "downtime." Complete standardization of National Sections means minimum inventory requirement for spare parts.

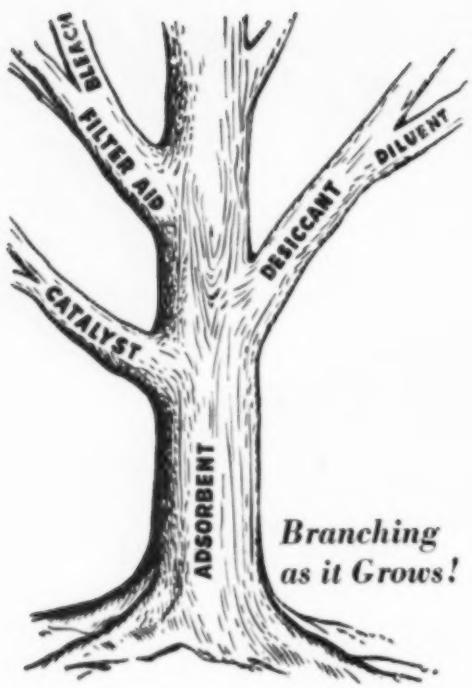
These economies in your condensing and cooling installations—and many more—can be yours with National Cast Iron Condensing and Cooling Sections. Let one of our field engineers show you how—without obligation, of course. Write for our catalog CP-16.

NRC

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introduced by the Floridin Company almost a half-century ago as a superior adsorbent for removing tars, gums, color bodies, etc., from petroleum oils .....

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The latest addition to our broad line of filter cloth is made from ORLON†, an acrylic fiber; it is recommended for hot filtration.

As manufacturers of an extensive line of Filter Cloth our analysis of and recommendations for your filter media problems would be unbiased . . . we "grind no ax" for any particular cloth.

Each of the cloths listed offers different operating advantages. Each type has its own range of chemical resistance, its own temperature limits and its own degree of resistance to moisture, molds, fungi and bacteria. We would be able to recommend a filter cloth that will give you the best service in your particular filtration operation.

Literature and test samples are available on request.

† T.M. E. I. du Pont de Nemours & Company

Weavers of Industrial Filter Media for over Forty Years

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Safe, Accurate Transmission of Pressure Indications up to 1000'

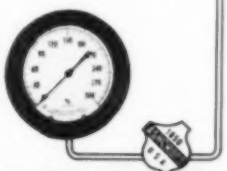
The new Ashcroft Pneumatic Pressure Transmitter is a safe, accurate *and economical* method of transmitting pressure indications from their originating source to a central control point.

Employing *only low air pressure*, this new transmitter is particularly suitable for use in those industries where hazards of fire and explosion exist.

The Ashcroft Pneumatic Transmission system consists of a transmitter capable of measuring any pressure from *15# up to 50,000# per square inch* and delivering low pressure air—proportional to the indicated pressure—to a distantly located Receiver Gauge. Long, high pressure lines are avoided. Inflammable, poisonous or corrosive liquids and gases are confined close to their source.

The overall accuracy of the entire system—transmitter and receiver—is within ½ of 1%.

If you require the transmission of pressure indications *over 1000'*, the new Microsen Electronic Transmitter is available. Detailed bulletins describing both the Ashcroft Pneumatic and the Microsen Electronic Pressure Transmitter are available upon request.



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A Product of

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Makers of Ashcroft Gauges, Hancock Valves, Consolidated Safety and Relief Valves and 'American' Industrial Instruments. Builders of 'Shaw-Box' Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties.



At a ton-a-minute, this machine loads Wyandotte Soda Ash into boxcars.

TODAY AND TOMORROW

you can depend on your supply

of **WYANDOTTE SODA ASH**

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REG. U.S. PAT. OFF.

Because of new and expanded facilities for the production of Wyandotte Soda Ash, this uniform chemical is available for prompt shipment in carload quantities.

If you need Soda Ash now, or if your planning for the future requires a dependable supply of Soda Ash, be sure that the Wyandotte Sales Representative in your area is fully acquainted with your requirements. You can count on the same thorough service and the same dependable product which have made Wyandotte one of the world's largest producers of this and many other basic chemicals.

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LET'S BRING THIS DOWN TO EARTH

Quality is a term that is often used broadly, casually. In the case of Chase, quality means more efficient, more economical, and more attractive containers for your products. And here's why:

Chase has been manufacturing bags for more than 100 years—and every year has marked some important improvement: in construction, in design, in printing, or in packaging technique!

Result: you get dependability, positive protection, and you get double-barreled satisfaction, too: 1) when your product is shipped, 2) when your product is received.

There is a Chase bag for every need—write us today for complete details.



MULTIWALL PAPER BAGS

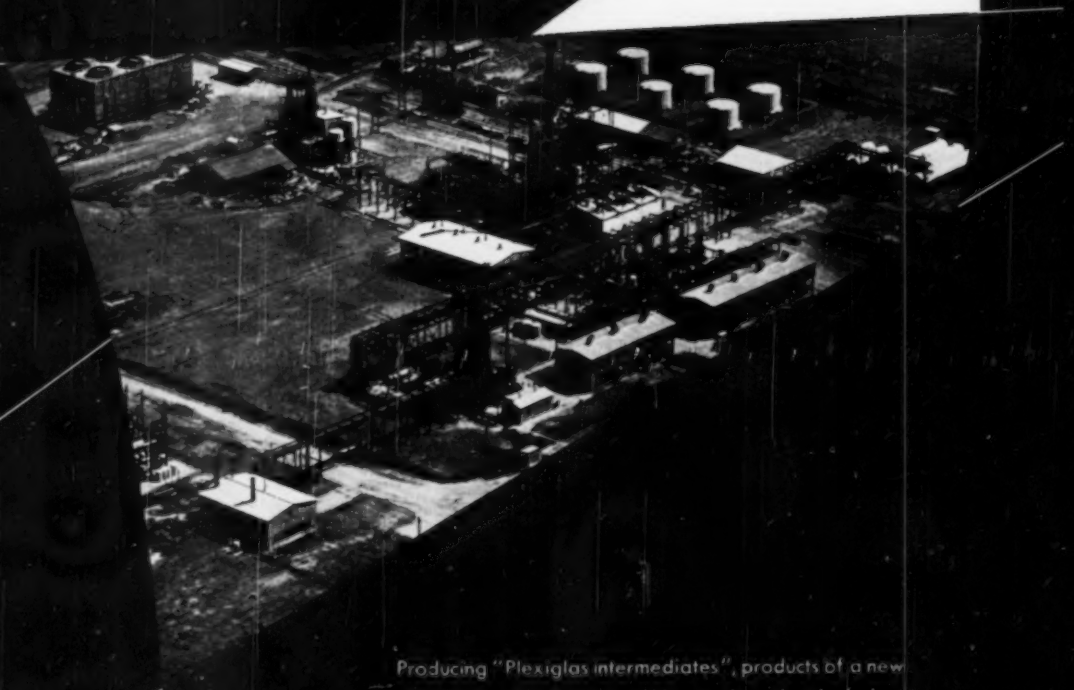

Chase Lined and Combined Bags
Chase Pretty Print Cotton Bags
Chase Liners—Crinkled and Pleated

1847

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engineering projection - - - into *Plexiglas*

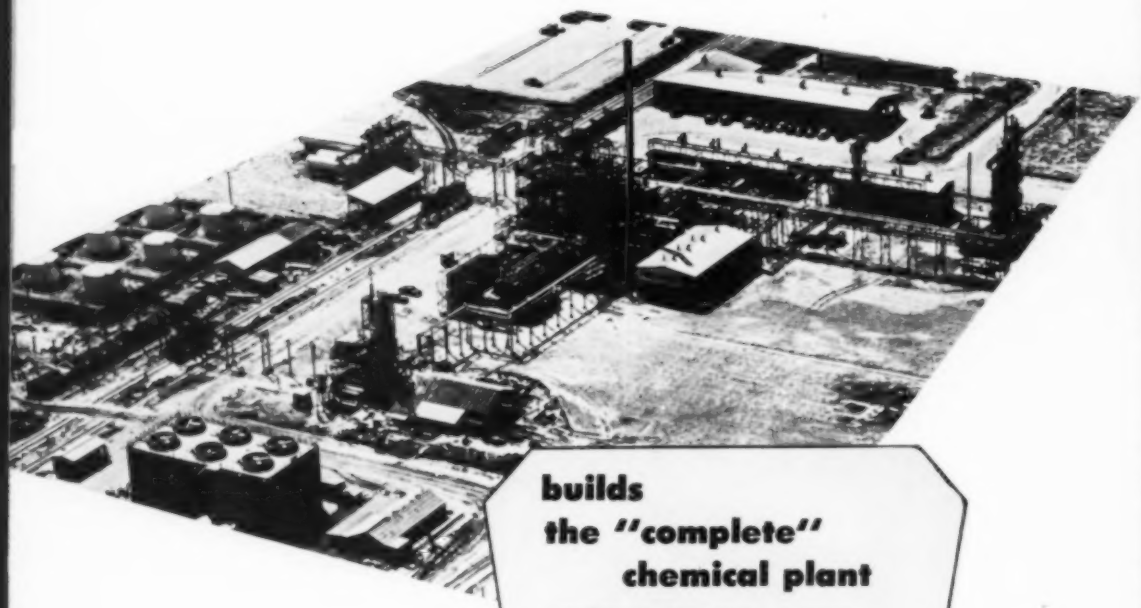


Producing "Plexiglas intermediates", products of a new catalytic synthesis process, this complete chemical plant represents the collaboration of the Rohm & Haas Company who supplied the basic process design data, and the Foster Wheeler Corporation who provided mechanical design, engineering, and construction.

FOSTER WHEELER CORPORATION

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the "complete" engineering service . . .



builds
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THE CONTINUOUS VACUUM FILTER . . .

Oliver Panel Filter

This filter is recommended for the consideration of those who are now handling by pressure filtration or by special types of filters, solutions producing thin, sticky cakes or solutions with relatively little solid matter; for example, clay slips, sewage sludges and certain industrial wastes. The Panel Filter can handle such products efficiently and bring to the operator all the superior advantages of continuous vacuum filtration inherent in the standard Oliver Filter. The absence of wire winding permits this and the installation of the cloth in small sections, caulked into place between sections, keeps the cloth smooth and in proper operating condition. It also reduces the time needed for replacements.

With sizes available ranging from 3 to 790 square feet of filter area, it should not be difficult to find an Oliver Panel Filter size to take care of your requirements. So, if you think this filter might fit into your picture, will you tell us about your problem? We would like to hear about it anyway regardless of its nature because we have many other types of filters from which to select and our recommendations are based on more than 40 years of filtration experience.

. . . with no drum wire winding

. . . with panel size cloth sections

. . . with ability to discharge thin, sticky cakes



OLIVER UNITED FILTERS INC.

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The next time you have a drive problem—



Rotary drier driven by Jones Herringbone Speed Reducer.

WHEN you have a drive problem that calls for a speed reducer, don't overlook Jones. All that we ask is an opportunity to present the features of Jones Herringbone, Worm and Spur Speed Reducers that have caused them to be selected for so many applications in process plants. The accompanying illustrations are typical of the Jones drives that are to be found in a wide variety of chemical plants, paper mills, paint, varnish, and plastics plants, and a host of similar applications.

Before you decide on your next speed reducers, we shall appreciate the opportunity of assisting you in the selection of drives to meet your specific requirements.

W. A. JONES FOUNDRY & MACHINE CO.
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Vertical agitator driven through Jones double reduction Herringbone Reducer.



Jones Herringbone Reducer driving ball mill.



Vertical agitator driven by Jones Worm-Helical Speed Reducer.



CATALOG NO. 70 —Both standard and special applications of Herringbone Reducers are covered in this new catalog with technical information on applications.

BULLETIN NO. 75—Jones Worm-Helical Speed Reducers for vertical shaft drives, with rating tables, dimension diagrams, torque charts etc.

Copies will be sent on request.



Jones

HERRINGBONE—WORM—SPUR—GEAR SPEED REDUCERS • PULLEYS
CUT AND MOLDED TOOTH GEARS • V-BELT SHEAVES • ANTI-FRICTION
PILLOW BLOCKS • FRICTION CLUTCHES • TRANSMISSION APPLIANCES

THE FINEST
FILTRATION
SAVES MONEY TOO!



. . . when you buy
ALLEN

ALLEN INDUSTRIAL FILTERS, long famous in bacteriology and industry for air, gas and light liquid filtration, are now available for chemical laboratory, research and manufacturing. ALLEN INDUSTRIAL FILTERS contain Mandler Diatomaceous Filter Candles, consisting of opal or colloidal silica. True filtering is accomplished since the Mandler Candle is a porous medium and not a burned out cellular material. They have a high amount of absorption, are easily removed and cleaned, come in a complete range of sizes and densities. Write us the details of your problem and we'll be glad to send you literature and more information.

THE ALLEN INDUSTRIAL FILTER CO.
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WHAT MAKES A MAILING CLICK?



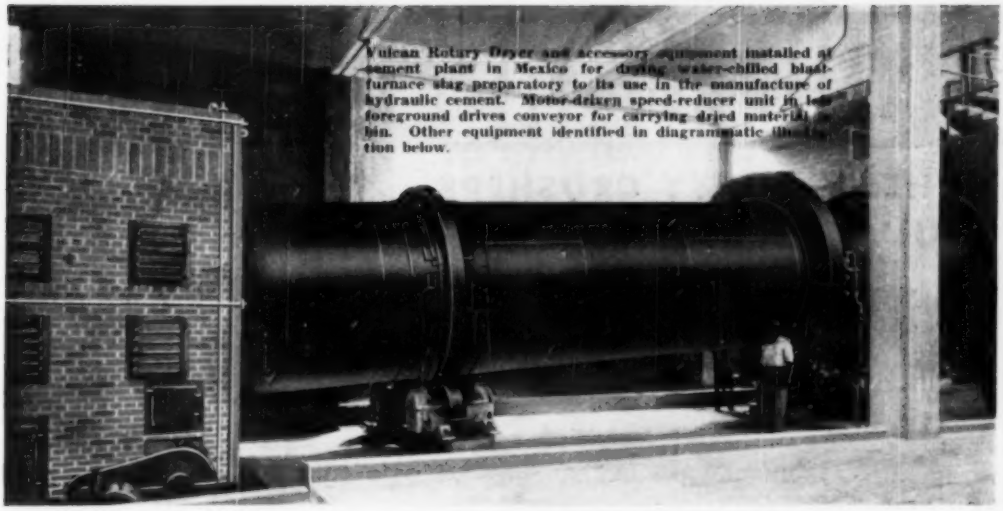
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Vulcan Rotary Dryer and accessory equipment installed at cement plant in Mexico for drying water-chilled blast-furnace slag preparatory to its use in the manufacture of hydraulic cement. Motor-driven speed-reducer unit in left foreground drives conveyor for carrying dried material to bin. Other equipment identified in diagrammatic illustration below.

Vulcan Rotary Dryers are backed by a

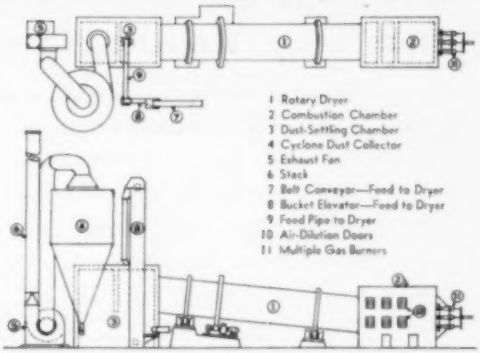
HUNDRED YEARS

of Successful Manufacturing Experience

Not many manufacturing companies in this country have operated continuously and successfully for a hundred years. That the Vulcan Iron Works has achieved this distinction is, in itself, an indication of uniformly high standards in both the design and construction of its many products for users of heavy industrial equipment.

For more than fifty years we have furnished a constantly increasing variety of Rotary Kilns, Coolers, Dryers, Retorts, etc., to the rock products, chemical processing and metallurgical industries. The widely diversified experience thereby acquired is always at the service of prospective purchasers and often enables our engineers to make money-saving suggestions.

Correspondence regarding the drying, calcining or cooling of any inorganic material is cordially invited. Estimates, constructive suggestions and preliminary designs will be submitted, as far as possible, without charge or obligation.



Plan and elevation of Vulcan dryer installation shown above. Provision is made for delivering a large volume of hot gases to dryer at relatively low temperature, which can be controlled within narrow limits—also for collecting and reclaiming dust. Other carefully-engineered features assure high efficiency at minimum expense for operation and maintenance.

Vulcan Iron Works

Established 1849

WILKES-BARRE, PA., U.S.A.

Cable Address "Vulworks Wilkes-Barre"

Other Vulcan products include all types of Industrial Locomotives, Electric Hoists, Mining Machinery, Sugar-Mill Machinery, Heavy Special Machinery, Fabricated Steel Products and Open-Hearth Steel Castings up to 20 tons in weight. Bulletins on request.

WILLIAMS

HEAVY DUTY CRUSHERS
PULVERIZERS . . . SHREDDERS



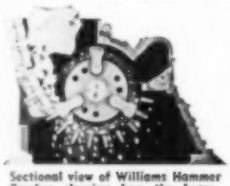
"SLUGGER" TYPE
CRUSHER
FOR CRUSHING CRUDE MATERIAL

Many successful installations attest their dependability and low operating cost

● No matter what the job requires, there is a standard Williams machine for the reduction requirements. Capacities range from 50 pounds to 300 tons per hour, permitting selection of exactly the proper size for your work.

The "Slugger" Type shown above is ideal for the primary reduction of crude ores, etc. Crushes by the Williams Hammer Principle, with rows of heavy, free swinging, fast revolving hammers crushing the material by impact until of proper size to pass through the grates. The ideal machine for the job.

We solicit your inquiries



Sectional view of Williams Hammer Crusher showing how the heavy, free swinging hammers reduce the material to desired size.

THE WILLIAMS PATENT CRUSHER & PULVERIZER CO.
2706 North Ninth St. St. Louis 6, Mo.

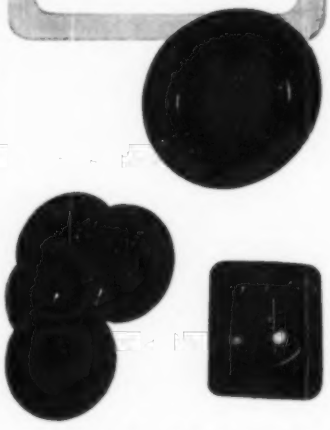
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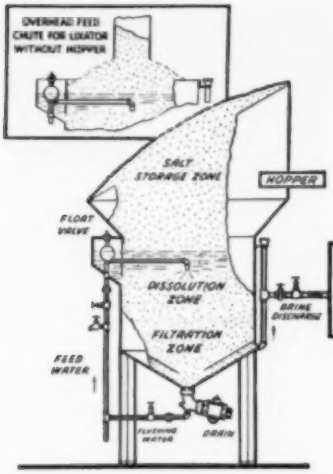
Tygon, the chemically inert plastic, possesses distinct advantages for gasketing in acid handling service. It is tough, flexible, highly resistant to corrosion. The slight swelling that occurs under exposure to certain chemicals adds to its effectiveness as a gasketing material. It is most effective through a temperature range of 0°F. to 150°F. Tygon is available in sheet, tube or rods from which you may cut your own gaskets, or we can furnish gaskets or diaphragms molded to your specifications.

●

Write for Bulletin

PLASTICS & SYNTHETICS DIVISION
U. S. STONEWARE
Akron 9, Ohio

The LIXATE pipe line to efficient brine distribution



Brine delivered by pipe to every point of use in your plant.

THE LIXATOR *automatically* provides 100% saturated crystal-clear, self-filtered brine that can be piped, by gravity or pump, anywhere . . . at any distance . . . it is needed in your plant.

HOW THE LIXATOR WORKS

In the dissolution zone—Flowing through a bed of Sterling Rock Salt which is continuously replenished by gravity feed, water dissolves salt to form 100% saturated brine. In the filtration zone—through the use of the self-filtration principle originated by International, the saturated brine is thoroughly filtered through a bed of undissolved rock salt. The rock salt itself filters the brine. Nothing else is needed.

JUST TURN A VALVE for Lixate Brine that meets the most exacting standards for chemical and bacterial purity . . . that can be diluted volumetrically to any desired strength.

THE LIXATE PROCESS for Making Brine cuts production costs as high as 20% . . . by cutting labor, time and waste in making brine. No hauling, measuring, stirring . . . YET ALWAYS a continuous supply of *accurately measured* brine.

Consult our Technical Service Department on your use of salt and brine. The experienced men on this staff will advise you on the proper location for Lixator and salt storage, pumping arrangements, types of pumps, meters, and valves. They will fit the *money-saving* Lixator into your plant operations. Write today!

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The New Stainless Steel
STERLING MODEL LIXATOR
For "Lifetime" Use
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For Added Cleanliness

The **LIXATE** *Process*
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for making brine
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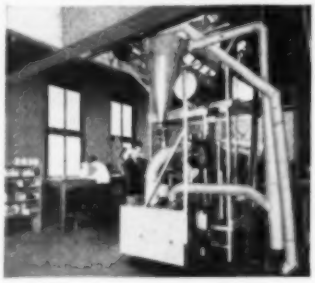
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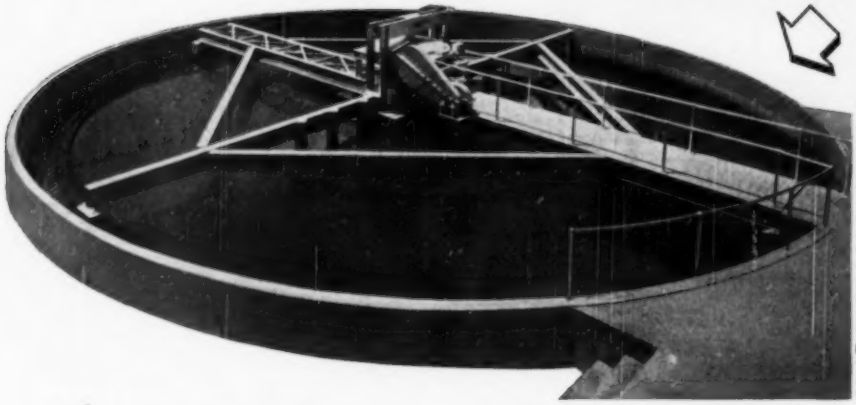
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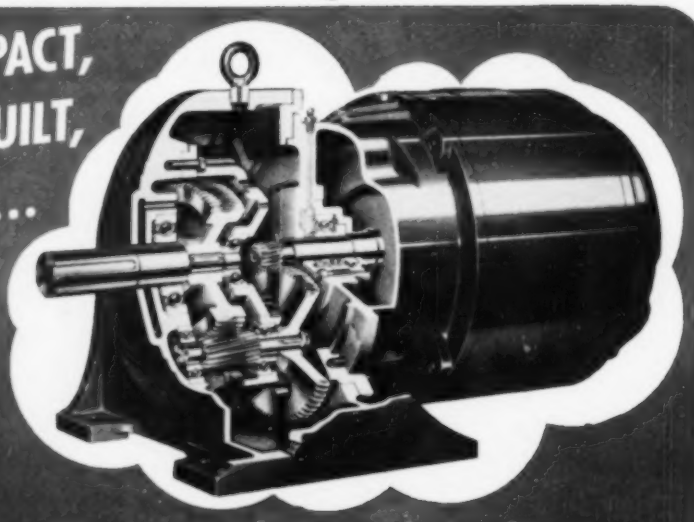
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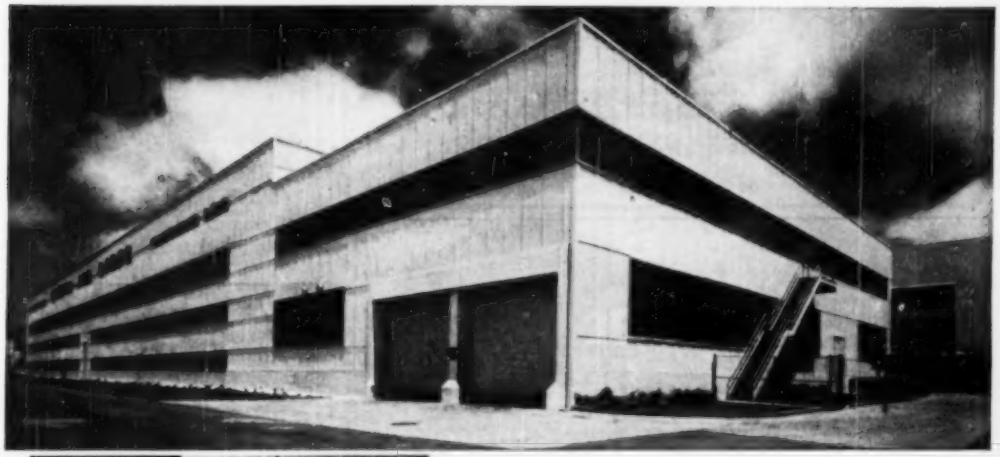
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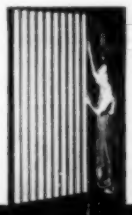
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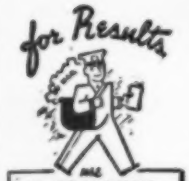
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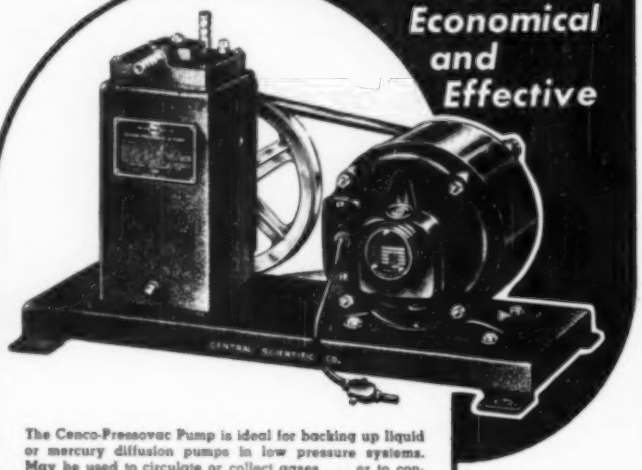
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Important Questions..

about iron and steel scrap for every top business man in every industry

Q. *How* bad *is the shortage of scrap?*

A. Actually, we have enough scrap to get along, but too much of it is *light* scrap. What is badly needed today is more *heavy* scrap.

Q. *Why more* heavy *scrap?*

A. Because heavy scrap will produce *more and better* steel in *less* time.

Q. *Why is the heavy scrap shortage so* harmful *to our economy?*

A. Half of all the ingredients that are melted to make steel and castings consists of scrap iron and steel. The short supply of heavy scrap during the past year limited the production of steel mills and foundries. At the present record rate of production, there is still not nearly enough steel to meet the current and anticipated demands of our domestic economy, military requirements, and ERP. More heavy scrap will help bridge the gap.

Q. *What's being* done *about it?*

A. A drive . . . and everybody is cooperating . . . is being started for industrial scrap, to (1) help step up present steel production, and (2) *create a visible reserve of heavy scrap in the event of national emergency.*

Q. Why *is there a shortage of heavy scrap?*

A. Several reasons:

1. Very little of the 123,000,000 tons of steel and steel products exported during the war has come back as scrap.
2. With replacements scarce and expensive, much old equipment which would normally have been junked by now, is still in use.
3. A halt has been called on the junking of old vessels and military equipment which has until recently been a source of scrap.
4. The amount of heavy scrap produced in fabrication —the left-overs of machinery, etc.—is not enough to meet the demand for new steel and castings.

Q. *How about the heavy scrap that must exist in huge quantities in* Germany *and* Japan?

A. Some of this will be coming through, but not in good quantities until preparation and transportation facilities within those countries improve.

Q. *Where can* additional *scrap be obtained from domestic sources?*

A. From industrial plants which have on hand large amounts of heavy scrap in the form of obsolete machinery, idle equipment—tools, dies, jigs, fixtures, etc.—and unnecessarily large repair parts inventories. Such scrap is the best possible type for the manufacture of quality steel.

Q. *Isn't such material* ordinarily *turned in as scrap?*

A. Experience shows that plant "housekeeping" is not particularly good when plant production is high. People are too busy. However, if executives realized the critical situation, they would order the necessary steps to be taken.

Q. *How can I help in this drive?*

A. Appoint one top official in your plant as a Salvage Director —with full authority to give orders and throw out everything that is not going to be needed. Have him consult with your trade association's Steel Scrap Drive Committee. Call in your local scrap dealer. (Incidentally, the prices paid for scrap are the highest ever.) Promote your scrap drive by meetings of department heads and through plant bulletin boards and newspapers.

Q. *How do I benefit from moving scrap in addition to the money received for it?*

A. 1. You get the use of much-needed and expensive floor space now occupied by such equipment and material.
2. You eliminate the cost of keeping records and inventory.

Q. *When does the scrap drive* start?

A. Right this minute. The very next thing to do after reading this page, should be to start *your* plant's scrap drive!

Q. *What is the goal of this drive?*

A. One million tons of *heavy* scrap . . . and "housecleaning" in your plant will help.

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Management's first responsibility is to show a fair profit. This requires a relentless search for continued improvement – in design, in purchasing, in production, research and cost-accounting. Each deserves its place at the management table. Yet none of these activities can actually create a dollar of profit, for the simple reason that you can't *produce* anything at a profit – not unless you can also *sell* it.

And that's what makes the advertising manager's job so important.

His first responsibility is to see that your company's products are made familiar (and desirable) to the greatest number of prospects, at the lowest possible cost. In fulfilling this responsibility, he sets a parallel course with the sales department, although his approach more closely resembles that of the assembly line technician.

For advertising, as he sees it, is simply the application of assembly line techniques to the *manufacture of a sale*. Just consider the five basic steps involved:

1. **Seeking out prospects**
2. **Arousing their interest**
3. **Creating a preference for your product**
4. **Making a specific proposal**
5. **Closing the order**

By *mechanizing* the first three of those steps, advertising increases management's chance to show a profit. It leaves your salesmen free to concentrate on the two jobs which they alone can do, and do best.

And nowhere does this mechanizing process operate more efficiently than in the business press, where it reaches your best prospects at the lowest possible cost.

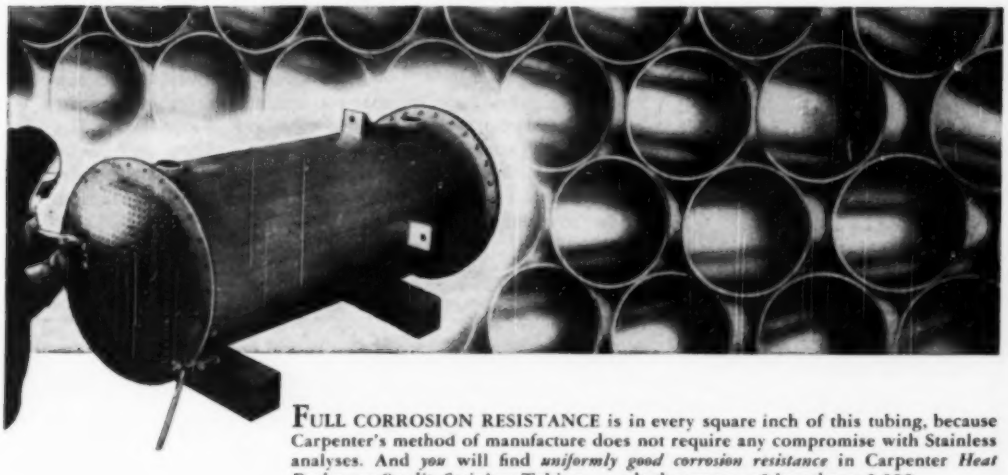
Perhaps that's why so many smart advertising managers are partial to business paper advertising – and why more of them, incidentally, are getting to sit at the management table!

CHEMICAL ENGINEERING
With Chemical & Metallurgical Engineering
A McGraw-Hill Publication
330 West 42nd Street New York 18, New York

THE ASSOCIATED BUSINESS PAPERS
205 East 42nd Street, New York 17, N. Y.

ABP's BUSINESS IS TO BOOST YOUR BUSINESS

This is *WHY* YOU CUT PROCESS COSTS with *Carpenter* HEAT EXCHANGER QUALITY Stainless Tubing . . .



FULL CORROSION RESISTANCE is in every square inch of this tubing, because Carpenter's method of manufacture does not require any compromise with Stainless analyses. And *you* will find *uniformly good corrosion resistance* in Carpenter *Heat Exchanger Quality* Stainless Tubing . . . whether you use 2 lengths or 2,000.

UNIFORM HEATING and COOLING is provided by the *exceptional wall uniformity* of Carpenter *Heat Exchanger Quality* Stainless Tubing. There are no "heavy sections" in the tube wall. Uniform radiation can be provided at all points of the tube's circumference.

SMOOTH I.D. and O.D. SURFACES assure better flow conditions and speed processing. The smooth, sleek surfaces of Carpenter *Heat Exchanger Quality* Tubing guard against excessive scale and sludge formations.

LIGHT GAUGE TUBING can be used because of the *wall uniformity* that protects you against premature tube failure. With Carpenter *Heat Exchanger Quality* Stainless Tubing there are no "thin sections" where stress or corrosion could get an early foothold.



16-PAGE BOOK OF ENGINEERING DATA ON HEAT RESISTANCE & HEAT TRANSFER

A note on your company letterhead will start this Stainless Tubing information on its way to you . . . Physical Properties, Heat Resistance and Heat Transfer Characteristics, Velocity Constants and many useful tables. Write today for your copy.

THE CARPENTER STEEL CO. • *Alloy Tube Division*

105 Springfield Road, Union, N. J.

Carpenter

HEAT EXCHANGER QUALITY

STAINLESS TUBING

"MORE THAN CORROSION RESISTANCE"

24-HOUR SERVICE—You get definite delivery information within 24 hours when you call your Carpenter Stainless Tubing Distributor.

SEARCHLIGHT SECTION

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT — USED or RESALE

WANTED

for HYDROCOL PLANT
SYNTHESIZING PETROLEUM PRODUCTS
AND CHEMICALS
Located at Brownsville, Texas

Supervisory Personnel

Including:

- Power Engineer
- Power Department Foreman
- Instrument & Electrical Foreman
- Process Engineers
- Storehouse Supervisor

Opportunities in new industry for men with practical experience in Petroleum Refining or Chemicals Plants.
Write stating experience, age, education and salary required.

Address: **Carthage Hydrocol, Inc.**
70 Pine Street,
New York 5, N. Y.

OUTSTANDING POSITION OPEN

Engineer to direct Sales of Refinery process units. Qualifications to include sales and process engineering experience with major oil companies or petroleum engineering and contracting firms. Knowledge of oil refining process engineering plus economic evaluations and applications necessary. Age 35 to 45 years. Excellent compensation—salary and bonus. Location—New York or Tulsa. When replying state educational and experience background. Our own employees notified of opening. Address—

P-8560, Chemical Engineering
520 N. Michigan Ave., Chicago 11, Ill.

REPRESENTATIVES WANTED

Established sales engineering companies to handle chemical processing equipment in Southern States, Southwest and Pacific Coast.

Our client is a well known eastern manufacturer producing mixing, blending, material handling equipment and custom built units.

Give complete experience, present territory and size of organization.

Replies will be held in strict confidence and for the exclusive use of our client.

CHARLES H. WELLING & Co.
INC.
52 Vanderbilt Ave
NEW YORK 17, N. Y.
Industrial Consultants

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St., (18)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITIONS VACANT

POST OF Works Superintendent in an Electrolytic Caustic Soda and Chlorine Plant situated abroad in the East. Applicant should be well qualified and considerably experienced in running, maintenance and development. He should preferably be conversant with the problems of Chlorine utilization and should be in a position to set up Pilot Plant and conduct operation leading to full development of chlorinated products—both organic and inorganic. Applications will be treated in strict confidence. P-7467, Chemical Engineering.

ENAMEL CHEMIST Formulator. Growing, centrally located paint manufacturer desires an enamel chemist formulator. State educational background, experience and salary desired. P 8379, Chemical Engineering.

WANTED: AN Experienced metallurgical sales engineer on ferroalloys and metals. Prefer a man with actual open hearth and electric furnace operating experience who is familiar with the uses of, particularly, all grades of ferrosilicon and ferrochrome. Give complete qualifications, experience and references. Reply for confidential attention: Charles F. Colbert, Jr., President, Pittsburgh Metallurgical Company, Inc., P. O. Box 836, Niagara Falls, New York.

SELLING OPPORTUNITIES OFFERED

SALES ENGINEER (30-35) New York District Sales Agency well established desires man familiar process equipment such as chemical or power; resident New York zone, for industrial plant contact. Some sales experience desirable, not essential. Correct personality, initiative and dependability important for congenial successful association small group. SW 8364, Chemical Engineering.

WANTED—SALESMAN technically educated and experienced in chemical field. Must be aggressive and able to analyze markets. Give complete sales and personal history, and salary expected, together with recent snapshot. Marathon Corporation, Chemical Division, Rothschild, Wisconsin.

(Continued on page 378)

CHEMICAL ENGINEERS

We need Jrs. & Srs. with degrees.
TECHNICAL LIBRARIAN-head dept. .... $8400.
EQUIP. DSGN. Chem. Eng. Degree ..... 7500.
DIR. DEVELOP. Ph.D. ..... 8400.
Call or Write GLADYS HUNTING
CASTLE & ASSOCIATES, INC.
220 S. State St. Chicago 4, Ill.

QUALIFIED PUMP ENGINEER

with experience in refinery and chemical type pumps

Must have thorough knowledge of various types of pumps and their application, packing, seal oil systems, materials of construction, and be able to write specifications, select proper equipment and assist in designing installations. Applicant should have about ten years' experience.

Location—New England.

P-8419, Chemical Engineering
330 West 42nd St., New York 18, N. Y.

SALESMAN WANTED

We are distributors for the finest mills in the country and have an opening for a salesman, preferable under 30, who has:

1. Sales personality.
2. Sales ability.
3. Knowledge of metals and their application.
4. Desire for a permanent position.

Interviews can be arranged in many cities in the Middle and Southwest.

Address:—

CARL T. WEDEMEYER
METAL GOODS CORPORATION
432 Julia Street **New Orleans 12, La.**

SALES ENGINEERS

Unusual opportunity for two resident sales engineers, in Houston and West Texas. Technical education, minimum two years experience in sales engineering or application of industrial instruments in petroleum or chemical process industries. Write fully, outlining experience, qualifications, and salary requirements.

***Address:* J. J. Burnett,**
c/o The FOXBORO COMPANY
154 E. Erie St. **Chicago, 11, Illinois**

WANTED—SALES ENGINEER

Equipment manufacturer wants man between 30-40 with experience in operating or selling Pulverizing Machinery. Must be willing to travel. Prefer M.E. degree. Give full particulars regarding previous experience, education, salary expected, age and family status. Write

P-8438, Chemical Engineering
520 North Michigan Ave., Chicago 11, Ill.

Additional Employment & Business Opportunity Advertising on page 378

"Consolidated"

PRICES GO DOWN AT NEWARK SHOPS

Come and see Machines in Stock, see how we Rebuild them with our

MODERN TOOLS AND EQUIPMENT

SPECIAL ITEMS FROM STOCK

DRYERS

1—Buffalo, Vacuum Shell Dryer, 60" x 80", 20 shelves.
1—Louisville Steam Tube Dryer, 6' x 50'.
1—Direct Heat Rotary Dryer, 3' 6" x 28'.
1—Rotary Vacuum Dryer, 5' x 33'.
1—Buffalo, Double Drum Atmos. Dryer, 32" x 72".

CRUSHING & GRINDING, PULVERIZING

1—Raymond 5-roll High Side, complete with motor and accessories.
2—Raymond No. 000 Pulverizers, and 1—No. 0000 Pulverizer.
1—Micro Pulverizer, 4TH, also 1—2TH.

KETTLES

3—7500 gal. Steel Kettles, with copper coils, closed. Agitated. 10' dia. x 12'6" deep, 15' overall height.
1—2000 gal. Steel Kettle, jacketed, open top. Agitated. 7' dia. x 7'6" deep.
1—1200 gal. Aluminum Kettle, Jacketed. Closed. 5' dia. x 6'6" deep.
20—250 gal. Copper, Jacketed, Kettles. Open Top, with stands, 50" dia. x 42" deep.

CENTRIFUGALS

2—48" Troy Steel Basket Centrifugals, with V-belt motor drive.

FILTERS

1—No. 12 Sweetland Filter, 4" centers, iron or copper leaves.
1—No. 10 Sweetland Filter, 2" centers, iron or copper leaves.
1—No. 5 Sweetland Filter, 2" centers, copper leaves.
1—8' x 12' Acid Proof Oliver Filter.
3—36" Sperry 60-plate Filter Press, cast iron. Recessed, center feed, open delivery, hydraulic closing.

MIXERS

2—Baker Perkins Mixers, size 17. Jacketed, 200 gallon.
1—W & P Mixer, size 16, unjacketed, 150 gallon.
8—Baker Perkins Mixers, size 15, jacketed, 100 gal.
1—W & P Mixer, size 12, jacketed, 20 gal.
1—1,000 lb. Stedman Drum Mixer, motor driven.

LIQUIDATING

ATLAS POWDER CO., Coated Fabrics Division, Stamford, Conn.

MIXERS

2—J. H. Day 20 gal. Brighton Mixers, pulley driven.
2—J. H. Day 40 gal. Change Can Mixers, motor and drive.
1—Ross 50 gal. Mammoth Change Can Mixer, pulley driven.

COLLOID MILLS

3—Colloid Mills, each directly connected to 2-Terry 10 HP, 5,000 RPM Steam Turbines.

TANKS

20—Vert. and Horiz., riveted and welded, from 2,000 gals. to 12,000 gals.
6—Blue enamel lined, 30" x 36", 100 gal. each, bolted-on dished covers with 14" manhole, 3" bottom outlet, leg supports.

SCALES

2—Portable Dial Scales.

RUBBER & PLASTICS COMPOUNDING

3—18" x 50" Rubber Mills, with motor and drive.
1—6" x 12" Laboratory Mill and Calender.
1—Royle No. 3 Strainer, 4½" screw, right angle drive and motor.

All Replies to Box 1115, Stamford, Conn. **Phone: Stamford 3-2171**

WANTED: YOUR IDLE MACHINERY

SEND US YOUR LIST NOW!

THE KEY TO SAVING TIME AND MONEY

FOR OVER A QUARTER CENTURY A SYMBOL OF CONFIDENCE

CONSOLIDATED PRODUCTS COMPANY, INC.

15 Park Row, New York 7, N. Y.—Tel. BArclay 7-0600

Shops: 335 Doremus Ave., Newark, N. J. Cable Address: Equipment, N. Y.

WE BUY AND SELL SINGLE ITEMS TO COMPLETE PLANTS

SEARCHLIGHT SECTION

(Continued from page 376)

EMPLOYMENT SERVICES

SALARIED POSITIONS $3,500-$35,000. If you are considering a new connection communicate with the undersigned. We offer the original personal employment service (39 years recognized standing and reputation). The procedure of highest ethical standards, is individualized to your personal requirements and develops overtures without initiative on your part. Your identity covered and present position protected. Send only name and address for details. R. W. Bixby, Inc., 240 Dun Bldg., Buffalo 2, N. Y.

EXECUTIVES $3,000-$25,000. This reliable service, established 1927, is geared to needs of high grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Jira Thayer Jennings, Dept. B, 241 Orange St., New Haven, Conn.

POSITIONS WANTED

INSTRUMENT ENGINEER, E.E., 9 years experience head of instrument dept. large chemical company, knows application, design, installation, maintenance instrumentation for batch and continuous process, familiar corrosion problems, specialize eliminating bottlenecks and increasing production, desire connection with manufacturer or user. PW 8570, Chemical Engineering.

FIRE PROTECTION—Safety Engineer. Technical Graduate. Insurance company training and experience. Fifteen years experience with large industrial organizations, desires position with large corporation to organize and supervise safety program and to reduce insurance rates by installing modern fire protection equipment. PW 8012, Chemical Engineering.

MECHANICAL ENGINEER (52) Technical graduate, desires position as assistant to busy executive to assume full responsibility for plant rehabilitation, production and reducing operating costs. 26 years experience in Chemical and Food Industries. PW 8188, Chemical Engineering.

CHEMICAL-MECHANICAL Engineer-Inventor past record—approximately six patentable inventions per year. Prefer working in southwest for petroleum or petro-chemicals company. Specialty—devising new equipment for operations which can not be done with existing equipment. PW 8422, Chemical Engineering.

PRODUCTION AND Development. ChE 37, 7 years research and production manufacturing metallurgy, 3 years zinc pilot plant, 4 years manager nonferrous metals refinery, 3 years director of research. Thoroughly experienced in solving production problems and handling men. Enjoy organizing development programs. PW 8414, Chemical Engineering.

MECHANICAL ENGINEER; age 30, excellent background in organic chemical plant maintenance. Desires responsible position on West Coast, commensurate with qualifications and experience. PW 8537, Chemical Engineering.

CHEM. ENGR. 23, veteran, desires position in development work B.S. chemistry, 1944, B.S. in Ch.E. 1948. Exp. lab director, supervision size manufacturing. PW 8429, Chemical Engineering.

POSITIONS WANTED

CHEMICAL ENGINEER: Thoroughly experienced in process development, plant design, construction, and manufacturing in organic chemicals field. Seeks position as chief engineer with progressive company where outstanding ability and effort can be fully utilized. PW 8469, Chemical Engineering.

SELLING OPPORTUNITIES WANTED

ESTABLISHED MANUFACTURERS' Agent seeks additional representation New York metropolitan area. Interested in petroleum, chemical processing and industrial equipment. RA 7845, Chemical Engineering.

AGENTS FOR Greece. We are now able to accept agencies in Greece for American firms, manufacturing chemical products. Contact Dr. Thalis Cassimatis, Chemist and Pharmacist, 4 Alipedu Street, Piraeus, Greece.

SALES ENGINEER, 52. Graduate mechanical experienced chemical engineering, desires Metropolitan New York representation of large industrial equipment. Twenty-five years sales experience. Broad contacts. Excellent engineering background. Salary or commission. SA 8012, Chemical Engineering.

FABRICATORS OF STAINLESS AND CARBON STEEL VESSELS AND PROCESS EQUIPMENT FOR THE CHEMICAL, PETROLEUM AND OTHER INDUSTRIES THERE IS AVAILABLE A PERSON OF WIDE EXPERIENCE, A PRODUCER WITH TOP FLIGHT INDUSTRIAL CONTACTS TO SELL YOUR PRODUCTS IN NEW YORK, NEW JERSEY, AND ADJACENT TERRITORY.

RA-8368, Chemical Engineering
330 West 42nd St., New York 18, N. Y.

EQUIPPED LABORATORY AND PILOT MANUFACTURING PLANT

Located on secluded 125 acre tract 19 miles from Wilmington, Delaware. Ideal for research and development or for retired chemist or engineer. Modern construction throughout.
Also partially completed stone dwelling.

SALE PRICE - $60,000.00

Direct inquiries to

Estate of Jacob Barab, Deceased
c/o L. C. Parker, Realtor
1014 Delaware Ave. Wilmington, Delaware

CHEMICAL EXECUTIVE AVAILABLE

Senior executive with diversified knowledge of salt, food and feed. General plant, products control. Chemical research and engineering experience. B.S. Degree. Available as Technical Director or Plant Manager.

PW-7889, Chemical Engineering
520 North Michigan Ave., Chicago 11, Ill.

PLANT MANAGER

B.S. in Chem. Eng. Lehigh Univ. Age 36. Married. 15 years in plastics and chemical manufacture. Last eight as General Plant Manager. Exper. in design and operation of chemical equipment. Executive ability. N. J. preferred.

PW-8410, Chemical Engineering
330 West 42nd Street, New York 18, N. Y.

TOP GRADE CHEM. ENG.

Wants to help chem. industry as consultant. Thoroughly experienced in all kind of engineering work.

PW-8216, Chemical Engineering
330 West 42nd Street, New York 18, N. Y.

PATENT

Utilization of patent for high speed vacuum-evaporator with proven success, is available for responsible manufacturer with the proper sales organization.

BO-8320, Chemical Engineering
330 West 42nd St., New York 18, N. Y.

WANTED • CHEMICAL PLANT

Large financially powerful diversified organization wishes to add another enterprise to present holdings

CASH PAID

For Capital Stock or Assets Existing Personnel Normally Retained

Box 1221
1474 B'way, N. Y. 18, N. Y.

AVAILABLE...

RECOVERY FACILITIES

All types crude mixtures
DISTILLATION and EXTRACTION
High Temperatre High Vacuum
Simple Distillation Difficult Fractionations
Separation of close-boiling liquids, isomers, and azeotropes our specialty
Drum Lots - Tank Cars

TRULAND

CHEMICAL & ENGINEERING CO., INC.
P. O. Box 426, Union, N. J. Unionville 2-7250

STAINLESS STEEL SPECIALISTS

STAMPED - FORMED - WELDED
STAINLESS STEEL PRODUCTS
Send drawings (Est. 60 Years)
C. W. CARLL SONS
Cole & Linwood Sts. Trenton 8, N. J.

IT'S APRIL—BUT YOU'RE NO FOOL—
WHEN YOU BUY FROM—

MAHONEY FOR MACHINERY

982 Stuyvesant Ave. Union, N. J.
NEW—USED—REBUILT
A NEW HIGH IN PERSONAL SERVICE
"Machinery Shopping" for the Busy Plant Executive. We locate equipment you need or buyer for your surplus. "Finder's Fee Basis."

PROCESSING - PACKAGING
MATERIALS HANDLING

WANTED - CHEMICALS

Dyes—Colors—Pigments
Oils—Waxes—Drugs
By-Products—Wastes—Equipment
CHEMICAL SERVICE CORP.
80A Beaver St. New York 5, N. Y.

CHEMICAL PLANT

For Sale or Lease

MODERN CONSTRUCTION
Completely Equipped With latest type machinery
Priced very low for quick sale.
MCALLEN, TEXAS
For particulars write
BO-8544, Chemical Engineering, 330 West 42nd Street, New York 18, N. Y.

"BEST IN THE FIELD"

YOU CAN SAY THAT AGAIN
ABOUT

GELB EQUIPMENT

BEST QUALITY
BEST VALUE

1—Plate Fabricators Jacketed Kettle, 900 gals. 125 PSI in jacket.
1—Kovin 200 gallon Jacketed Kettle, 75 PSI, anchor type agitator.
1—3 gallon Jacketed Kettle, 60 PSI in jacket.
1—Cast Iron Jacketed Kettle with agitator, 600 gallons.
1—Pfaudler 500 gallon glass-lined Jacketed Kettle.
1—2,200 gallon Jacketed Kettle with agitator.
1—Stainless Steel Jacketed Kettle, 220 gallons.
1—Blaw Knox Jacketed Agitated Autoclave 3' x 4'2".

2—Black & Clawson double drum Dryers, 28" x 60".
1—Louisville Rotary Steam Tube Dryers, 6' x 50'.
1—Louisville Rotary Steam Tube Dryers, 54" x 30'.
1—Rotary Steam Tube Dryer, 6' x 35'.
2—Buffalo Double Door Vacuum Shelf Dryers, 12 and 15 shelves.
1—Buffalo Single Door Vacuum Shelf Dryer, 17 shelves.
1—Barlett & Snow Direct Heat Dryer, Brick lined 8½ x 50'.
3—Buffalo Drum Dryers, 5' x 12'.
1—Stokes Vacuum Dryer, 4' x 10'.
2—Stainless Steel Hersey Rotary Dryers, 30" x 16', 36" x 16'.
1—B & S Double Drum Atmospheric Dryer, 3' x 6'.
1—Shriver Plate & Frame Filter Press, 7" x 7".
1—Johnson Plate & Frame Filter Press, 36" x 36".
1—Sperry Skeleton 30" x 30".
1—Shriver Rubber Plate & Frame Filter Press, 36" x 36", closed delivery, 30 chambers.
2—Shriver Filter Presses, 42" x 42", 46 chambers, hydraulic closing device.
1—Vallez Lab. Filter #2E.
1—Shriver Bronze Plate & Frame Filter Press, 18" x 18".
1—Shriver 42" x 42" Filter Press Skeleton.
2—Sweetland Filters #12.
5—Vallez #2B Filters, with Glass, Aluminum, Rubber covered and copper leaves.
1—Shriver 36" x 36" Cast Iron Plate & Frame Filter Press, Closed delivery.
1—Sperry 18" Filter Press, closed delivery, wooden plates and frames.
2—Independent Filter Presses, 18", closed delivery.
1—Stainless Steel Storage Tank, Closed, 300 gallons.
5—Monel Storage Tanks, 1,800 gallons.
1—10,000 gallon storage tank, 1" shell.
1—Stainless Steel Storage Tank, 4' x 5'.
1—Stainless Steel Storage Tank, 6,000 gallons.
1—Nickel lined Jacketed Kettle, 4,000 gallons.
1—Patterson-Kelly Jacketed Kettle, 600 gallons, with agitator.
1—Pfaudler Glass lined Kettle, 220 gallons.
1—Struthers Wells Jacketed Kettle, 120 gallons.
1—Durirron Kettle, 430 gallons.
2—Jacketed Kettles, 1100 gallons, 5½' x 5½'.
1—200 gallon Jacketed Kettle with agitator.
1—Jacketed Kettle 300 gallons with agitator.
1—10 gallon lead lined jacketed Kettle.
1—Abbe Buhrstone lined Pebble Mill, 6' x 12', with Motor.



THE GELB GIRL APRIL, 1949

1—Kent Pony Mixer, 30 gallons, with motor.
1—J. H. Day Powder Mixer, 400 lbs.
1—Kent Jacketed Powder Mixer, 800 lb. capacity.
2—J. H. Day Powder Mixers, 800 lb. capacity.
3—Ross Pony Mixers, 45 gallons.
1—Ross Powder Mixer, 2,000 lb.
5—Simpson #0 Intensive Mixers, (New).

1—Abbe Silex-lined Pebble Mill #3½.
1—Abbe Silex-lined Pebble Mill, 8 gallons.
1—Patterson Porox-lined Pebble Mill, 48" dia. x 24".
1—Allis Chalmers Ball Mill 58" O.D. x 18', Silex lined.
1—Abbe Pebble Mill, 3' x 4'.
1—Crossley Porcelain lined Pebble Mill, 100 gallons.
3—Hardinge Conical Ball Mills, 8' x 30", 5' x 24", 6' x 22".
1—Farrell 2-roll Rubber Mill, 16" x 36".
1—Thropp 2-roll Rubber Mill, 16" x 30".
2—Smidth Iron Lined Tube Mill, 4' x 12'.
1—Abbe Tube Mill, 4½' x 15'.
2—Royle Extruders #1 and #2.
1—Ball & Jewell Rotary Cutter #½ with 5 HP Motor.
1—Ball & Jewell Rotary Cutter #½.
1—Ball & Jewell Cutter #2.
3—Munson #0 Rotary Cutters.
15—Sharples Super Pressurite Centrifuges with 3 HP Explosion Proof Motors.
1—Tolhurst center-slung rubber lined Centrifuge, 30" basket.
1—Tolhurst 20" rubber-lined centrifuge.
1—Fitzpatrick Comminuting Machine, Model D.
2—Mikro Pulverizer #2TH and #1SH.
1—Cumberland Granulator with 15 HP Motor.
15—Lummus and Struthers Wells Condensers 110 to 580 sq. ft.
1—Kewanee 125 HP Boiler 125 lbs. pressure.
3—LaBour Stainless Steel Centrifugal Pumps #10, #20 and #25.
1—Gemco Conical type Blender, 2½ cu. ft.
1—Netco Portable Agitator, 6½ HP.

Established 1886

R. GELB & SONS, Inc.,

CHEMICAL, RUBBER, OIL, PLASTIC and FOOD PROCESSING MACHINERY

STATE HIGHWAY No. 29, UNION, N. J. • UNionville 2-4900

"BUY BRILL — BUY THE BEST"

DRYERS

14—3 Truck Atmospheric Steam Heated Dryers, 500 sq. ft. drying surface each.
1—Devine 3'x16' stainless clad Rotary.
4—Kilns Rotary, 9'8"x230', 9'x80'.
2—Bonnot 5'x40', 3'x45' Rotary Dryers.
2—Ruggles-Coles Dryers 70"x35', 4'x20'.
3—Rotary Vacuum Dryers 4'x20', 5'x30'.
1—Buflovak Vacuum Shelf Dryer with 19-42"x42" shelves.
2—Buflovak 32"x90" Atmospheric Double Drum Dryers.
1—Pfaudler 2'x10' glass-lined Rotary.
3—Louisville Tubular Rotary Dryers 6'x25', 6'x30'.
2—P&S Apron Dryers 36', 45'.
1—Spray Dryer Stainless Steel, 8' chambers.

PULVERIZERS—MILLS

3—Abbe 6'x8', 5'x4' porcelain lined, jacketed Pebble Mills, motor driven.
2—Patterson 21"x28", 3'x4' steel Ball Mills.
5—Patterson, Abbe, Bodgers Pebble Mills, 2'x3', 3'x3', 3'x4', 4'x5', 8'x9'.
2—Mikro Pulverizers 18H, 2TH.
1—Porter Multiple Jar Mill, 4-1 gal. jars.
1—Fitzpatrick Type D Comminuter S.S.
2—Hardinge 3'x24", 6"x22" Conical Mills.
4—Raymond 10 and 30 Imp Mills.
3—Raymond 20 and 200 Screen Mills.
2—Raymond 3 and 4 Roll Low Side Mills.
2—Dixie Hammer Mills 3020, 2424.
1—"Jay Bee" Hammer Mill size 2UX.
2—Tyler Hummer 3'x5', 4'x5' Screens.
1—Jersey 24"x30" Type "A", 500HP motor.

CENTRIFUGALS

1—Bird 40" stainless steel, suspended.
2—AT&M 48" stainless steel suspended, solid baskets, 30HP motors.
4—AT&M 48" suspended, copper perforated baskets.
1—Tolhurst 36" stainless steel, m.d.
1—Rochester 30" suspended, monel.
1—Bird 18"x28" monel, continuous.
2—Sharples 16 Vaportite Centrifuges, stainless bowls, 2HP motors.

FILTERS

1—Sweetland 7, 27 leaves.
1—Sweetland 5 stainless clad.
2—Sweetlands 2, 17 leaves.
1—Oliver 5'4"x8' Acid Vacuum Rotary.
3—Oliver 6'x8', 8'x13' Vacuum Rotary.
1—Feinc 3'x1' stainless Rotary Vacuum.
4—Shriver 24" P&F cast iron.
2—Sperry 30"x30", 24"x24" Wood P&F.
3—Sperry 30"x30", 24"x24" Cast Iron.
4—Sperry Type 36"x36" Cast Iron P&F.
3—Sperry 42"x42" Aluminum P&F.
1—Sperry 36"x36" Wood P&F, 28 chambers, 1¾" cake.

CRYSTALLIZERS—KETTLES

6—1600 gal. steel, closed, jacketed Tanks.
1—Struthers-Wells 400 gal. closed, jacketed, agitated Pressure Kettle, 5HP.
4—Buflovak 6' Vacuum Crystallizers.
6—Dopp 250, 150 gal. steam jacketed, agitated Kettles, high pressure.
3—Pfaudler 75, 100, 150 gal. glass-lined, steam jacketed, agitated Kettles.
10—Metal Glass 25 to 100 gal. Tanks.
25—Stainless Steel Kettles, 50 to 500 gal.

MIXER—SCREENS

1—Day 8 Ro-Ball 40"x120" stainless.
2—Rotex 82 Doub' Deck, 40"x120".
1—Rotex Triple Deck, 40"x84".
1—Day Ro-Ball 4 Deck, 20"x80".
1—Robinson Single Deck, 20"x48".
4—Baker Perkins Stainless Lab. Double Arm Mixers, 1 and 2 gal.
1—Readco stainless 4 gal. Mixer.
2—Baker Perkins 50 gal., sigma blades.
1—Baker Perkins 100 gal. stainless clad, jacketed, double arm Mixer.
1—Baker Perkins 4½ gal. jacketed Double Arm Vacuum Mixer.
15—Portable Electric Agitators, ¼ to 2HP.
8—Lightnin top entering Agitators, 3HP.
1—Robinson 1000-lg. rubber-lined Batch Mixer, stainless steel Agitator.
2—1000-lb. steel, steam jacketed Mixers.
25—New and used Powder Mixers, 100 to 4000 pounds.

EVAPORATORS—STILLS

2—Goslin Birmingham Sextuple Effect Evaporators, 54,200 sq. ft. area.
1—Swenson Quad. Effect Evaporator, 40,000 pounds water per hour evaporation.
6—Copper Vacuum Pans 24", 42", 4', 6'.
1—Badger 30" Rectifying Col. with 30"x45' Beer Col., accessories & instrmts.

MISCELLANEOUS

2—Durco 2"x1½" Pumps, 5HP.
14—Olivite Acid Centrifugal 2" Pumps.
1—Nash 3 Vacuum Pump, 300 cfm.
2—Fuller-Kinyon 4", 5" Pumps.
2—Pyrex 2"x1½" glass centrifugal Pumps.
1—Lot of Celeron piping, fittings.
1500 ft. 16", 18", 24" Roller Conveyor.
300 ft. 9", 12" Steel Screw Conveyor.

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6—Anderson No. 1 Expellers, Cookers & Dryers
2—Dopp 1000 gal. closed agit. Jack Kettles Dop-ploy Acid Resisting & Iron.
7—Baker Perkins heavy duty jack. Mixers, 200, 100, 50, 9 & 7 gals.
1—Lehman 4 roll W.C. 12"x36" steel Mill, 20 HP.
3—Hardinge Conical Ball Mills 4½'x24", 3'x24" & 3'x6".
1—Devine Vac. Shelf Dryer 7 shelves 40"x42".
2—Devine #3 Vac. 4 shelf Dryers, elec. heated.
1—Buffalo Vac. Drum Dryer, 24"x20".
1—Badger 42" dia. Bubble Cap Column.
4—Albright-Nell 4'x8' Atmos. Drum Dryers & Flakers. Also other sizes.
5—Pony or Past Mixers, 5, 15 & 40 gals.
1—Lehmann & Voss 2 roll Mills, 3'x17', 9"x32", 12"x30" & 16"x40".
1—Mavro Stainless Steel Homogenizer.
2—Abbe & Lancaster Rotary Cutters 5 HP motor.
1—Hoochin 10"x30" 4 roll Granite Stone Mills.
1—Farrell 15"x36" Rubber Mill. Other sizes to 84".
1—Rubber Tubers & Extruders, 2½" to 6". 6-Banbury Mixers. Midget to No. 1 size.
5—Tyler 38 Jr. Hummer Screens 24"x60" & 28"x60" split screen.
6—Rotex Sifters 20" x 40" to 48" x 84".
6—Dopp Jack. Steel Kettles 250 to 1000 gals.
1—250 gal. lead lined Kettle.
5—Shriver 18"x24" wood & lead plate & frame Filter Presses.
12—Sperry & Shriver 16", 24", 30", 32" & 42" iron Filter Presses.
36—Frames & 35 Plates for Sperry 30" closed del. Iron Filter Press.
10—Tolhurst 40" Suspended type Centrifugals, bottom discharge. Also 20" to 48".
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1—Sharples No. 6, 2 HP.
1—Hubor type 25 ton Parts Block Press.
4—Stokes & Colton Rotary & Single Punch Tablet Machines ¼" to 1½".
1—U. S. Cotfeld Mill Stainless 5 HP. 1—Mavro Stainless Homog.
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1—Faust 150 gal. Jack. Steel Spiral Mixer.
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1—Sanco Jr. automatic vac. Bottle.
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Sturtevant 30" Rock Emery Mill & Robinson 510 Saw Tooth Crushers.
3—#2000 & #0 Raymond Mills. Also Low & High Side Mills.
2—DeLaval Multiple Clarifiers, 300 & 301, motor.
6—Simpson Intensive Mixers #0 to 3½.
1—Sprout-Waldron 10" B. B. Attrition Mill, two 7½ HP. motors.
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4—Stokes vert. high Vac. Pumps.
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1—10 HP. 3 phase totally enclosed fan cooled vertical motor with Philly Gear reducer having low speed output of 425 RPM.

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1—GE Portable Air Compressor (on wheels) with tank, motor and control.
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1—42" dia. x 24'4" Vertical Forge Welded Steel 400 lbs. Pressure—1300 gals.
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1—Motor driven barrel packer, with screw conveyor, trough and hopper.

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1—3'0" x 5' Cylindrical Blender with Stands and Drive.

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Large quantity of high and low pressure, high and low capacity blowers and fans in stock.

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1—36" O.D. x 5'10"—30 HP Vertical high pressure boiler with injector.

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1—24" Dia. x 21" deep "Day" kettle equipped with agitator drive. 40 gallon capacity.

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1—Pony Labelrite table model motor driven gummer with single phase motor.

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1—Tycos straight stem, glass front separable socket thermometer.

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2—50 gallon jacketed agitated open top C. I. kettles.
1—40 gallon jacketed copper kettle on C.I. stand.
1—29" dia. x 16" deep jacketed C.I. kettle with bolted-on C.I. cover.
1—32" dia. x 24" deep C.I. jacketed open top kettle—90 gallons capacity—on legs.
1—6' dia. x 10' deep, iron body with heating coil, agitator and drive, 3000 gal.
1—27" dia. x 22" deep copper, jacketed, lead lined on 3 legged stand.
1—4'6" dia. x 3' deep, steel jacketed, with agitator and drive. 350 gal.
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1—6'9" x 8'0" deep iron body, Sulphonator, Propeller Agitator Drive. Tight and Loose Pulley Capacity 2000 gallons.
2—12" dia. x 3' deep, aluminum lined, jacketed agitator, drive, tight and loose pulley.
1—30" O x 4' deep vertical steel kettle.
Stock of jacketed and unjacketed kettles always on hand.

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1—3 gallon laboratory pebble mill.
1—Charlotte stainless steel laboratory colloid mill with 1 hp. A.C. motor.
1—Raymond & 1 Pulverizer with 25 HP motor and 50 HP motor driven fan.
1—#1 Gruendler Hammermill with 7½ HP A.C. motor.
1—6' x 6' Throop Silex Lined pebble Mill.
1—6' x 5' Porcelain lined pebble mill. T & L pulley drive.
1—Raymond #0 Pulverizer with 25 HP A.C. motor. Raymond 4-0 Pulverizer without motor.
1—Raymond #0000 Pulverizer—belt drives.
1—Raymond #0000 Pulverizer—motor driven, complete with dust collector, cyclones, tubular ducts, steel frame work.
1—3' x 3' Abbe porcelain lined mill body, no doors, stands, bearing or drive.
1—"Britco" Hammermill with blower, screen and 25 HP. A.C. motor.
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1—24" dia. x 20" wide ball mill.
1—6' dia. x 20" deep Muller.
1—12" 30" Kent 3 Roller Mill.
1—10" x 40" Day 3 Roller Mill.
3—Lehmann 5 Roller Water Cooled Mills.

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3—20"x48" (12 cu. ft.) single ribbon and paddle mixers complete with drives, fully enclosed A.C. motors and starters.
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1—25 Gallon Jacketed single shaft agitated mixer.
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1—J. H. Day Single Blade Mixer 30" W x 36" L.
1—J. H. Day "Hercules" 6 Barrel heavy duty, tilting type mixer with A.C. Motors.

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1—Aurora Bronze-fitted two stage pump. 2½" inlet.
2—#30 Blackmer Rotary Pumps 60 GPM with 5 HP AC motors.
1—7½" x 4½" x 10" Worthington Duplex Steam Pump.
1—7½" x 5" x 6" Worthington Duplex Steam Pump.
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1—1500# Portable platform scale (37" x 49½").
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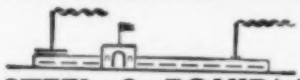
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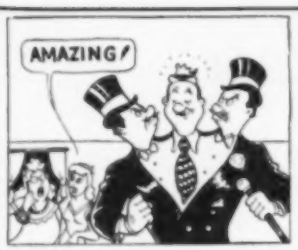
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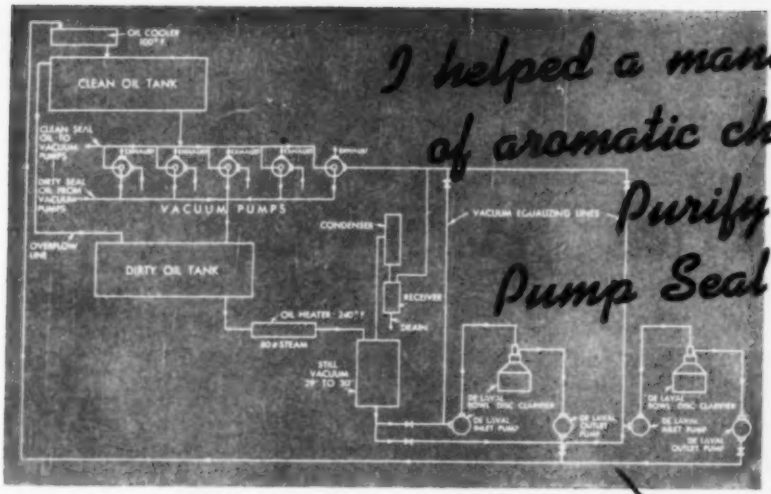
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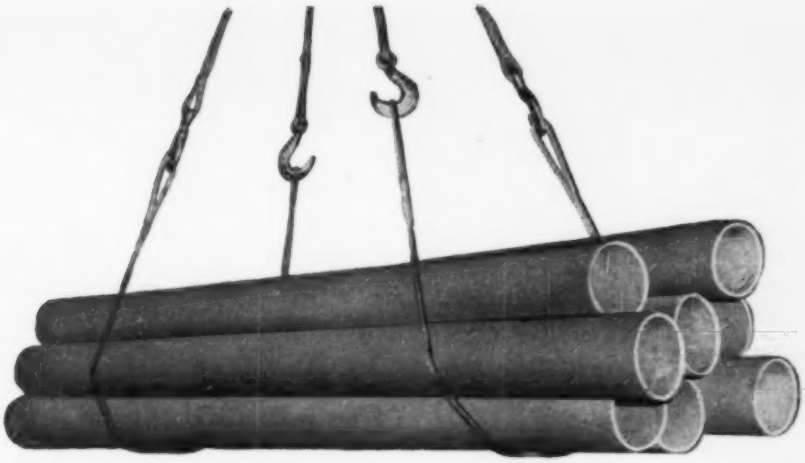
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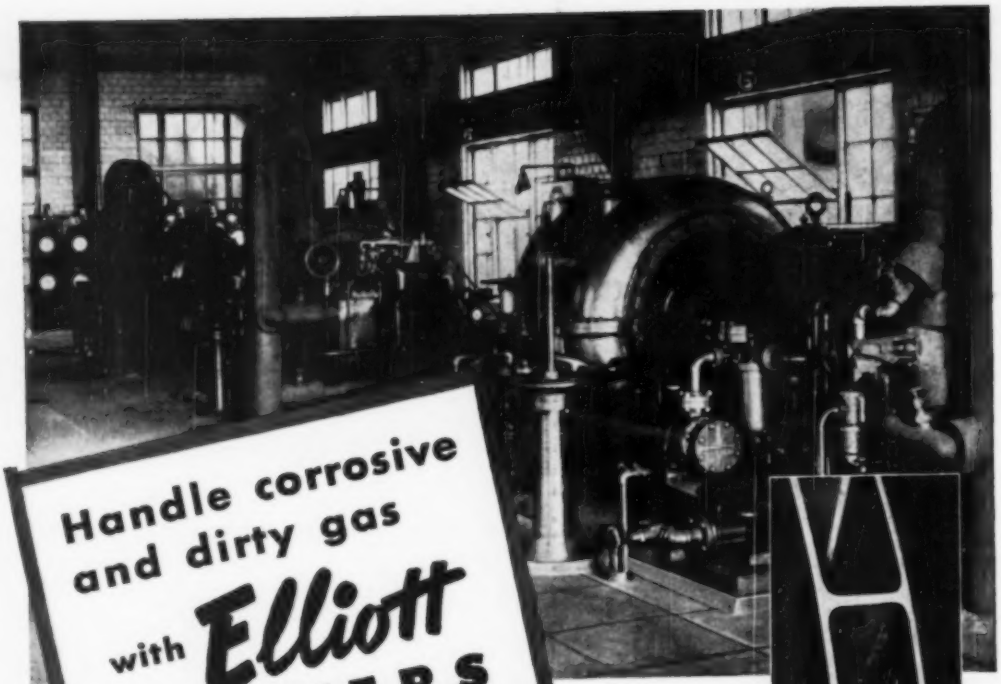
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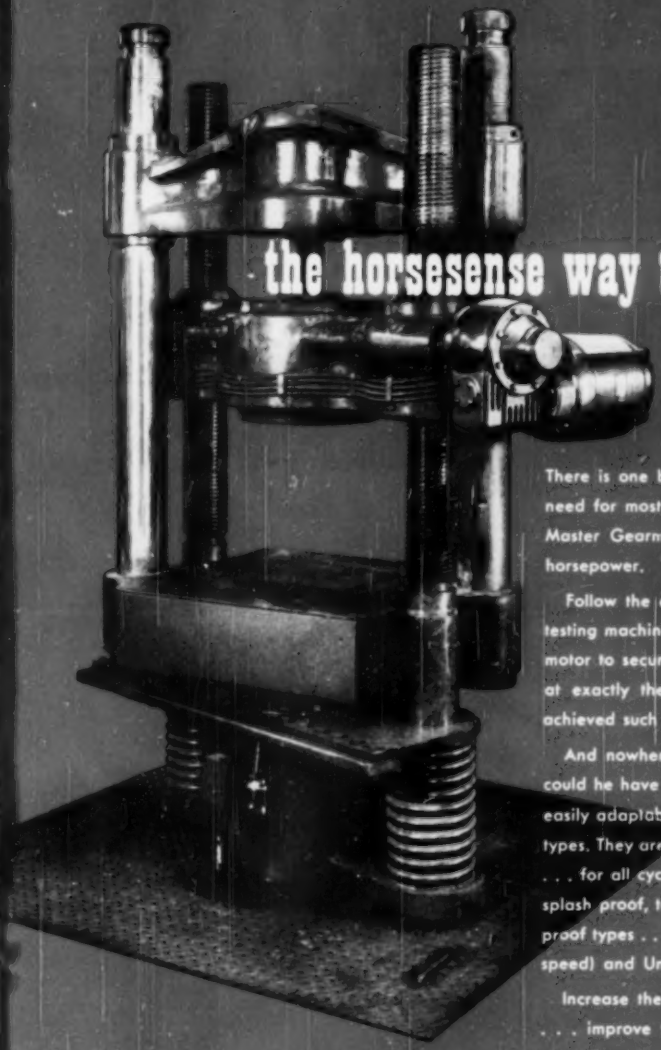
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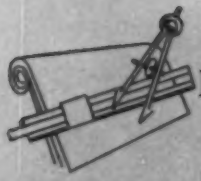
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